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Highlights Of This Issue

• Guard Rail on State Highways

A comprehensive study, made with the cooperation of state highway departments, on the use of guard rail, including statistical data on mileages, types of guard rail and posts, and costs, and discussing types, location and recent trends, appears in this issue.

See page 2.

• Temporary Timber Bridge

To replace an obsolete wood bridge on the Coastal Highway in Georgia, a temporary detour bridge of timber construction was erected to serve the heavy traffic on this route until the new steel high-level span is completed.

See page 9.

• County Casts Own Culverts

One of the features of the organization and equipment for road work in Lincoln Parish, La., is the Parish's own concrete culvert casting plant, a compact and efficient plant run by Parish prison labor.

See page 12.

• Ideal Highway Dept. Garage

Iowa's Maintenance Engineer describes that state's district maintenance garages and outlines what he considers the essential features of an ideal maintenance garage for highway departments.

See page 17.

• Novel Tandem-Paver Job

A 9.672-mile concrete paving job in Mississippi last summer was featured by the use of tandem pavers, many original methods and well synchronized crews, which combined to make an average daily run of 1,750 feet of 7-5-7-inch slab.

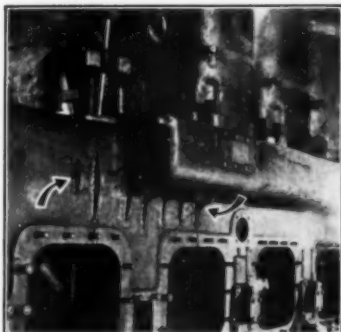
See page 28.

• New Equipment and Materials

Descriptions of the latest in construction equipment and materials, many of which were displayed at the ARBA Highway Exhibit, may be found in this and succeeding issues. Watch for them in order to keep up-to-date on the newest developments.

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The 27-Inch Crack in the Side of a Diesel Engine Sub-Base After Its Repair by Electric Welding

Welding Saves Time and Money

Difficult Repair Job on Diesel Sub-Base Completed With Speed and Economy on All-American Canal Job

By JOS. C. COYLE

(Photos on page 48)

♦ OVER 36 miles of the All-American Canal has been completed by the W. E. Callahan Construction Co. and Gunther & Shirley, including 6,000,000 cubic yards subbed by Boyce & Igo Construction Co. Three Bucyrus-Monaghan 10-W walking draglines and three 6-W machines of similar make and type, along with some other smaller machines, were used in the excavation, one 10-W and one 6-W by Boyce & Igo, the others by Callahan Company-Gunther & Shirley. The big machines, weighing 680 tons and

(Continued on page 20)

ARBA Pacific Coast Show a Big Hit

Special from the Editor, Theodore Reed Kendall,
to Contractors and Engineers Monthly

SAN FRANCISCO, March 7—The lure of the West has brought an unusually large number of manufacturers of nationally distributed construction equipment to the Thirty-Seventh Annual Highway Exhibit of the American Road Builders' Association here in the Civic Auditorium. Every train entering the city for the last few days has brought its contingent of highway builders from all sections of the country with the western group predominating.

On March 6 the Western Association of State Highway Officials began its sessions at the Fairmont Hotel with a heavy registration of delegates, while the Associated General Contractors of America were getting started at the Palace Hotel. The opening registration of the American Road Builders' Asso-

ciation this morning has passed the usual optimistic prophecies of the California hosts. In tune with the four construction industry conventions assembled here this week the Golden Gate Exposition has set aside the six days as Official Days for the different groups: March 5, Associated Equipment Distributors' Day; March 6, Construction Day; March 7, American Road Builders' Association Day; March 8, Associated General Contractors of America Day; March 9, Highway Engineers' and Officials' Day; and March 10, County and Municipal officials' Day. Thus the construction industry and its subdivisions are recognized in the minds of the great western populace whose interests are centered in the Fair of the West Coast.

(Concluded on page 36)

Subgrade Treatment Insures Success of D. B. S. T. Contract

(Photo on page 48)

♦ DOUBLE bituminous surface treatment, D.B.S.T., on a stabilized subgrade and a prepared gravel base is the order of the day in Alabama. Several such jobs were completed last summer on U. S. 241 between Birmingham, Ala., and Columbus, Ga. Among these interesting contracts was that of the Vandigriff Construction Co. of Montgomery, Ala., which built 10.5 miles of this type of road between Sylacauga and Childersburg, using mostly new equipment. Work started in October, 1937, and was completed before the expiration of the contract time in August, 1938. For such comparatively simple construction some individuals in the highway construction industry have been heard to remark, "It takes a long time to build a low-cost road." The care given to compacting the subgrade and the base under traffic is one of the causes of apparent delays in speeding completion. When the work is completed the state is sure that it has a foundation for its road instead of a weak base with an apparently strong surface which cracks quickly under traffic and has to be replaced or resurfaced with retreat.

Grading and Stabilizing Subgrade

This job called for widening of the old roadway, requiring a total of 45,000 cubic yards of cut and fill. Also there was some 10,000 cubic yards of subgrade treatment. The contractor opened a gravel pit which required an average haul of 5 miles from the pit to the job

Vandigriff Constr. Co. Completes 10.5-Mile Job With Much New Equipment Near Sylacauga, Ala.

for the placing of the stabilizing material on the subgrade and later for the gravel base courses. A Lorain 40 $\frac{3}{4}$ -yard shovel was used, loading to twenty new International $1\frac{1}{2}$ -ton trucks which hauled the material to the road and windrowed it down the center where it was spread with a Caterpillar 12-foot blade pulled by a Fifty tractor. The subgrade stabilizing material and the leveling course were both spread 30 feet wide.

First Base Course

The material, gravel, for the first base course was windrowed at the rate of 60 yards per station down the center of the road and then spread to a loose thickness of 6 inches. A variable amount of sand was also spread on the gravel to reduce the clay content to below 20 per cent. The gravel and sand were then mixed to within 1 inch of the subgrade with a Roman Major disk harrow built especially for road work.

The first course of gravel base gradually worked out to about 34 feet wide down the slope of the road and the second course was about 32 feet wide while the surface treatment was confined to a 23-foot width and the mat surface to 22 feet. The subgrade crown was $\frac{1}{3}$ inch per foot for 11 feet either side of the center line and for the remaining 4 feet was $\frac{3}{4}$ inch per foot. The contractor used traffic compaction only on the first base course with no water as the work was done during the winter when, during a part of the time, the rains added too much water for satisfactory working conditions. The base was constantly bladed for shape and careful maintenance during traffic compaction and

(Concluded on page 11)



C. & E. M. Photo
Vandigriff's New Kinney Air-Controlled Distributor Shot the Tar Prime Coat on the Base

Use of Guard Rail On State Highways

Amount, Types of Rail, Location, Types of Posts, Expenditures Reported by State Highway Depts.

★ ONE of the earliest attempts to provide safety at hazardous points on the highway was the use of some type of guard rail. In the horse and buggy days, steep slopes at the roadside presented little danger as travel was leisurely and a horse had too much intelligence to get too near the edge of a cliff. But the one thing the automobile manufacturers seem unable to give us in a motor car is that kind of intelligence or horse sense, and consequently with the advent of speedier cars came the necessity for guard rail. Today it is an accepted and generally used protection to the motorist at bridge approaches and drainage structures, along stretches of highways built on fill with steep slopes along the road-sides, and in mountainous sections where the highway winds along the mountain-side, with dizzy drops to the valley below on one side of the road.

Types of Guard Rail Used

Although a few states, including California, Illinois, Nevada and Rhode Island, have more wood guard rail than any other type, the tendency of recent years has been toward the cable or metal types. In Minnesota, North Dakota and Wyoming, more than half the guard rail is the single-cable type. Alabama, Con-

necticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, Vermont, Washington and West Virginia report from 60 to 100 per cent of the two-cable type. Of the guard rail installed in Colorado since 1930, approximately 85 per cent has been of this type. In Maine, old wooden rail has gradually been replaced with the two-cable type and at present this type of guard rail is being installed almost exclusively in Minnesota. On the other hand, South Dakota in 1935 changed from two-cable to the single-cable guard rail.

A good many years ago Nebraska installed principally single-cable and woven-wire-mesh guard rail mounted on 6-inch diameter posts. Some time later a considerable amount of two-cable rail was installed. During the past two or three years such guard rail as has been erected has been for the most part the sheet-metal rail-plate type. At the beginning of 1938, its guard-rail plan was revised to permit alternate bidding on various types of guard rail in competition with the three-cable type. During 1938 contracts for about 100,000 linear feet of the latter type were awarded, the lowest bid submitted being for the three-cable type.

In Georgia, all new installations are sheet-metal rail plate, 80 per cent of the guard rail in the state being of this type. Since 1933, all new installations in Indiana have also been of this type. Kentucky and North and South Carolina are

also using this type of guard rail as standard at the present time. Other states reporting more than 50 per cent of their guard rail as sheet-metal rail plate are Florida, Indiana, Kansas, Louisiana, Mississippi, New Mexico and Utah.

In states where snow conditions are severe and difficult to combat, such as Colorado, Idaho, Montana, Oregon and Vermont, there is a tendency toward the use of posts only, without any rail whatever, in an effort to minimize snow drifts.

Location of Guard Rail

In Arkansas, Colorado, Idaho, Louisiana, Montana, Nevada, New York, Ohio, South Carolina, Vermont and Wisconsin, the points at which guard rail is installed is determined by the conditions at each point, after field study. These points generally include sharp curves, high fills or a combination of both, bridge and drainage structure approaches and any other spots which appear to be dangerous. Alabama reports that it is installing guard rail at the present time only where conditions make it impracticable to widen shoulders and flatten slopes to 4 to 1. This state has found the latter method more convenient from the maintenance department's point of view and generally more satisfactory in creating safe conditions on the highway.

In California, guard rail is installed generally on all fills over 8 feet in height, on curves of less than 1,000-foot radius, on fills of less height where the curve radius is less than 300 feet, and at any other location where hazards exist. Guide posts spaced 50 feet or more apart are used for intermediate conditions to define the edge of fills on tangents and

(Continued on page 32)

New Grade Built Above Flood Line

John Iafolla Const. Co. Completes Section Along Connecticut River North Of Cheshire Bridge, Vt.

(Photo on page 48)

★ A SECTION of U. S. 5 about 15 miles north of Bellows Falls, Vt., was rebuilt last summer for a distance of 2.3 miles with funds allocated after the Connecticut River flood of 1936. The entire section of roadway was built 3 feet higher than flood level along the face of a series of rock and earth slopes. The westerly bank of the river was badly eroded by the floods of 1927 and 1936, and even the spring freshets of 1937 and 1938 cut into the banks along the old road, even though the adjoining farm lands were not flooded. The new location required about 145,000 cubic yards of sidehill excavation, including both hard ledge and earth as well as some bad clay. Some of the larger rock from the ledge excavation was used as riprap at the ends of the project where the roadway is nearest to the present river bank and hence more liable to erosion.

Ledge Excavation

The rock outcrops on this project occurred in four major locations. The first about 1/4 mile from the north end of the contract contained about 6,000

(Concluded on page 24)

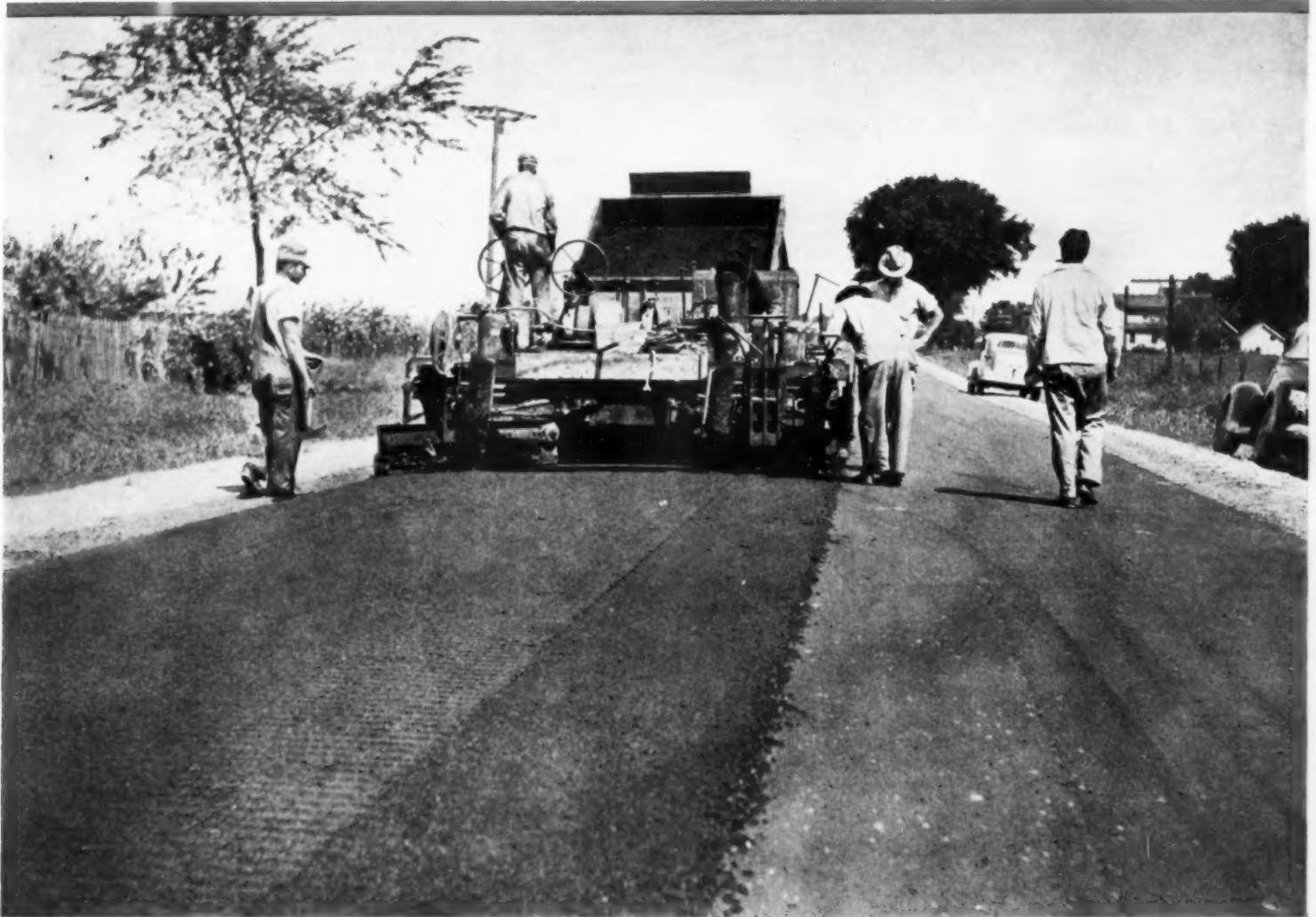
AMOUNT, TYPES OF GUARD RAIL AND POSTS, AND ANNUAL COSTS OF GUARD RAIL ON STATE HIGHWAYS AS REPORTED BY STATE HIGHWAY DEPARTMENTS
(Figures Are Approximate)

STATE	Amount of Guard Rail (In Feet)	Percentage of Types								Percentage of Types of Posts						Annual Replacements (Number of Posts)		Annual Installation of Guard Rail (In Feet)		Annual Costs			
		Single Cable	Two Cable	Three Cable	Sheet Metal Rail Plate	Woven Wire Mesh	Lumber	Log	Other Types	Wood		Concrete		Steel Rolled Section	Metal Section	Other Types	Because of Damage	Because of Deterioration	New	Replacements	New Installations	Replacements	Maintenance
										Untreated	Treated	Plain	Reinf.										
Alabama	No data		90		5	5																	
Arizona ¹	No data		0																				
Arkansas	280,000	3	17 ²	Some	42	15	4	7	20	75 ¹	0	0	0	0	0	1,194	774	No data	No data	No data	No data	No data	No data
California	300,000	11	13	Some	13	Some	17 ²	5	55 ¹	94 ²	0	Some	0	0	0			35,000	5,000	No data	\$6,000	\$10,000	
Colorado	1,084,541 ¹⁰				10					100 ¹¹						No data	No data	135,560 ¹³	No data	98,568	No data	No data	
Connecticut	4,503,080		80				9		2 ¹¹	100 ¹²						No data	No data		No data	19	No data	No data	
Delaware	No data	0	100							90 ¹³	10					70	20	15,000	900	30			
Florida	No data	0	0	0	80	16	2	0	0	100 ¹⁴	70 ¹⁴	50	100			Few	800	50,000	10,000	55,000	7,500		
Georgia	No data				43	20				100 ¹⁵						1,860	1,960	120,000	150,000	10,000	10,000		
Idaho	250,000	4	14		45	2	10	8	10 ¹⁶	100 ¹⁷						No data	No data	25,000	10,000	25,795 ¹⁸	No data	No data	
Illinois	2,500,000				10		90		10 ¹⁹	100 ¹⁴						200	None	30,000	250,000 ²⁰	25,000	125,000	No data	
Indiana	1,585,000		40		60					100 ¹⁴						240	4,000	237,600	4,000	200,000	5,000	45,000	
Iowa ²²	No data																						
Kansas	920,000	0	15	0	85	0	0	0	0	100 ²³		0	0	0	0	100	50	60,000	2,000	60,000	0	2,000	
Kentucky	1,000,000 ²⁴	95			5 ²⁵					100		0	100	0	0	100	25,000	5,000	12,500	3,000	2,000		
Louisiana	1,500,000	0	0	0	98	2	0	0	0	0	0	100	0	0	0	100	1,000	500	0	500	0	5,000	
Maine	No data	100								100 ¹⁴													
Maryland	2,840,000	100								100 ¹⁴													
Massachusetts	2,450,000	100					23		14 ²¹	100 ¹⁴		85						100,000	40,000	100,000	40,000		
Michigan	No data	100								100 ¹⁴													
Minnesota	3,000,000	88	12 ²¹	0	0	0	0	0	0	31	100 ²⁶	0	0	0	0	No data	No data	343,862 ²⁷	No data	73,238 ²⁸	No data	No data	
Mississippi	600,000	2	15		80	3			2 ²⁹	100 ¹⁴						No data	No data	No data	No data	No data	No data	No data	
Missouri	No data	30		30	25	15			40 ³⁰	93 ³¹				5		No data	No data	No data	No data	No data	No data	No data	
Montana	316,800	30	2		1	2	15	1		60 ³²						200	3,800	40,000	10,000	46,500	9,000	10,000	
Nebraska	No data																						
Nevada	77,634	7			4	3	54		32 ³³	100 ¹⁴						250	50	10,000	1,000	15,000	1,500	2,500	
New Hampshire	No data		41							50								8,000	1,000			41	
New Jersey	2,070,879	96					4			100 ³⁴						2,000	20,000	Varies	200,000	Varies	190,000	80,000	
New Mexico	No data				100					100 ³⁵								4,978					
New York	No data				Some		Some			100 ³⁶								600,000 ³⁷		5,515			
North Carolina	700,000	1	1	0	3	88			7 ³⁸	90	1	0	0	0	0	2,000	3,000	15,000	30,000	15,000	20,000	7,500	
North Dakota	No data	100								100 ³⁹								1,300		650			
Ohio	No data		10	5	45	3	40			90 ⁴⁰				10				300,000 ⁴¹	50,000	200,000	40,000	50,000 ⁴²	
Oklahoma	No data	10																					
Oregon	No data									100 ⁴³		0	0	0	0	1,500	1,500						
Pennsylvania	No data																			33,036 ⁴⁴			
Rhode Island	551,000									100 ⁴⁵						200	400	13,200	8,000	6,000	4,500	25,000	
South Carolina	200,000				50 ⁴⁶	5	43			50 ⁴⁷		50				20	10,000	1,600	21,000			42	
South Dakota	No data	Some	Some																				
Tennessee	1,330,619	14		0	36	5	10		34 ⁴⁸	75	23 ⁴⁹	0	0	0	0	No data	No data	2,000	200				
Texas	No data	20	0	40	10	10			30 ⁵⁰	0	100 ⁵¹	0	0	0	0	No data	No data						
Utah	12,772			100						47													
Vermont	227,000	0	78	0	0	0	22	0	63	0	100 ⁵²	0	0	0	0	70	11	114,000	7,800	58,000	3,000	0	
Virginia	5,016,000	0	5	5	30	35	20	0	37 ⁵³	100 ⁵⁴						1,000	1,000	30,000	0	15,000	0	8,000	
Washington	2,432,500	0	60	0	0	0	20	0	20	100 ⁵⁵		60				No data	No data	150,000	45,000	75,000	30,000	30,000	
West Virginia	224,000	1	85	0	3	3	1		67 ⁵⁶	90	100 ⁵⁷	0	0	0	0	No data	No data	No data	No data	No data	No data	No data	
Wisconsin	No data																						
Wyoming	36,000	65	23	0	10	0	1	0	0	0	100 ⁵⁸	0	0	0	0	300	100	26,000	1,500	20,800	1,200	1,200	

- No report received.
- Guard rail is being eliminated as rapidly as possible, slopes flattened to 4 to 1 where feasible.
- Expanded metal on wooden posts.
- Crescote or Wolmanized.
- With wood rail.
- Solid rail.
- Laminated rail. Other miscellaneous types amount to less than 1 per cent.
- Of which 95 per cent is redwood.
- All posts other than redwood have hot dip, crescote paint, asphalt or other miscellaneous treatments.
- Total amount installed by contract since 1930.
- Some used prior to 1930.
- 922,870 feet installed by contract 1930-1937.
- 161,671 feet installed by contract 1935-1937.
- Crescote.
- Yearly average installed by contract 1930-1937.
- Rustic log fence used on Merritt Parkway and pipe railing on retaining walls.
- Crescote or tar.
- Depends entirely on amount of highway constructed and available funds.
- 10-pound crescote treatment.
- 60 cents per foot for new installations; 30 cents per foot for replacements; end post attachment \$5.75.
- Cypress posts.
- Posts only, placed on 12-foot centers.
- Butt ends treated with crescote.
- In 1938.
- Some rustic log type in Cook County Forest Preserve.
- Replacement of obsolete types will probably be completed in 1939.
- No information available.
- Crescote and painted (2 coats).
- Estimated.
- Used 1937 and 1938.
- Multiple strand steel cable, 8 per cent; steel tape, 2 per cent; two wood rails on concrete posts, 2 per cent; all other types, 2 per cent.
- Circular steel shell anchor posts.
- Timber anchors and bottom 4 feet 9 inches of all posts hand painted with Grade 1 crescote oil.
- At present, Minnesota is using two-cable steel-post rail almost exclusively for new installations.
- There is some plank, wood, log and stone rail but the quantity is relatively small.
- Crescote; zinc chloride.
- 11-year average.
- Laminated lumber.
- Data not available in form for tabulation. See article.
- Steel beam type.
- Majority of guard rail of this type.
- Small amount.
- This state spent approximately \$50,000 in 1938 for work classified as maintenance which includes replacement of guard rail on bridges and structures.
- Small amount of untreated California redwood.
- Salts.
- The standard guard rail used is multiple-strand steel cable. Also some rustic timber on parkways.
- Standard post in this state.
- Average total amount installed annually at a cost of 85 cents a foot.
- Posts only, on 6-foot centers.
- Zinc chloride.
- \$15,000 for replacements and maintenance.
- No data available on amount. Types used include sheet-metal rail plate, multiple-strand cable, two-cable and steel tape.
- Standard guard rail is one-rail single-cable type.
- In 1937, includes cost of guard rail, eight posts and mail-box posts.
- \$27,183 for replacements and maintenance in 1937.
- Guard rail generally either single, two, three or four-cable, or sheet-metal plate.
- Practically all posts are of wood, experiments being underway with various types of treated timber.
- Experimental installations.
- All new guard rail purchased is sheet metal.
- 4 per cent.
- 1 per cent.
- \$20,000 for replacements and maintenance.
- Laminated wood used in Black Hills District; channel guard rail used adjacent to overhead structures on Federal-Aid system.
- Fall pitch-pine posts may be used without treatment.
- Less than 1 per cent each of single-cable, log and heavy.
- Wood posts only.
- Timber posts of Douglas fir, California redwood or Port Orford cedar. Douglas fir posts treated by crescote, Zinc-Meta-Arsenite, Wolman salts or zinc chloride.
- Single guide posts at all culverts where fill is small.
- Butt ends treated with crescote or coal tar.
- Several thousand.
- Very few.
- Earth embankment type.
- Butt ends treated with crescote or salts.
- Crescote; Zinc-Meta-Arsenite; Wolman salts.
- Earth mound, 2 per cent; stone walls, 1 per cent; woven wire mesh type, 2 per cent.
- Single and two-cable guard rail used generally for replacements.
- Three-cable or lumber types now standard for new installations.

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Sanity in Government Spending

The President's appeal for money for a huge defense program is a threat to the construction industry, as a sudden shift from the public works program of the past eight years might completely disorganize the future of highway and heavy construction. The Federal-Aid program for highways is safe for another two years, but the "patriotic fervor" with which a national defense program can be launched is extremely contagious and public support can easily be secured for the expenditure, or diversion, of large amounts of public funds, particularly when national safety seems to be involved. This danger arises at a time when the spending of vast emergency sums should be slackened to permit business and industry to expand and be able to take care of the additional taxes made necessary by the Government's priming and social security programs. Instead, a demand is made for billions more for a defense program, which might or might not include a large mileage of "auto-bahnen," or military roads along our coasts.

We are not opposed to sane government expenditures for general construction, an outstanding example of which may be found in Federal Aid for highways, but we do oppose any hysterical and unplanned program, whether put forward merely as an artificial stimulus to business or as a program of national defense. It is most important to avoid precipitate spending for any cause. We waste money in the sudden preparedness for war. The waste of 1917-1918 is still fresh in the minds of many of us. A continuous program of preparedness is

necessary, after we have formulated a policy of what we intend to defend, but no sudden and vast expenditure will solve the needs of defensive preparedness, nor will it solve the need for the strengthening of employment through business and industry. It might supplement WPA in binding votes to a political machine, but members of both major parties realize how low certain factions have stooped in this regard and have already taken steps to check further political exploitation of government money.

Let the sane members of our Congress, whom we hope are in the majority, sponsor a less sudden but intelligent program of national defense and at the same time seek a slow and methodical reduction in total Federal expenditures. As far as highway construction is concerned, reduction in emergency expenditures should be offset by insisting that state administrations use 100 per cent of all state vehicle and gasoline taxes for the purpose for which they are intended, highway construction and maintenance.

An example of sane planning for future construction is found in the State Highway Planning Surveys which are already showing where the real needs for highway construction exist. With a definite state-by-state construction program, based on these studies; a continuation of Federal Aid with its unification of routes; and the use of all gasoline and vehicle taxes for construction, reconstruction and maintenance, we can have a gradually expanding highway system, with multiple-lane roadways only where required and with bridge and grade-

Timber Bridge Design Prize Contest Announced

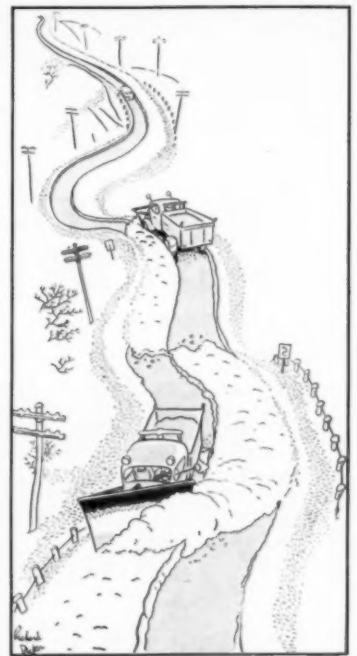
To stimulate interest in the use of timber bridge structures and to provide suitable designs for short-span timber bridges for secondary highways, a timber bridge design contest is being sponsored jointly by the National Lumber Manufacturers Assn., American Forest Products Industries, Inc., and the Timber Engineering Co., the latter company offering prizes of \$1,500 in cash. This contest, which closes August 15, 1939, is open to students as well as practicing architects and engineers. The purpose of the contest is to acquaint designing engineers with the latest developments and design practices of modern timber construction. As an added incentive to students, the prize money has been divided into two classifications: 1. for all contestants; and 2. for students only.

The rules require that the design submitted must be of a highway bridge constructed of timber and employing the timber-connector method of construction. The live load may be H-10 or H-15 and the span may vary from 30 to 70 feet, measured from center to center of bearings, but using only spans divisible by 10. The roadway must be 18 feet in the clear. Piers of supports need not be designed beyond the anchorage of the bridge to a concrete pier which shall be assumed to have been already designed. Assumption for dead loads must be stated on the drawing and the design predicated on the use of American Standard sizes of dressed lumber and timber surfaced on four sides.

The grand prize will be \$500 in cash, awarded to the contestant who submits, in the opinion of the judges, the best design for secondary highway use. In addition there will be six other prizes in this division ranging from \$200 for second best design down to \$50. The student submitting the best design will receive \$200, unless a student design is selected for the grand prize. Seventeen other student prizes totalling \$300 bring the total awards to \$1,500.

Further information on the rules and regulations of this contest may be secured from the National Lumber Manufacturers Assn., 1337 Connecticut Ave., Washington, D. C., to which contestants should send their designs before August 15, 1939.

separation projects as needed. This planned construction will furnish the backbone of a public works program to be speeded or continued at a uniform rate, in accordance with the employment needs of our nation.



Courtesy of The New Yorker and Richard Decker

Creating Jobs

"The belief that people can achieve social security by voting for it has become the foremost superstition in the United States. Jobs do not exist by right or by principle, but only as effective personalities create them. They can not be made artificially by business at large or guaranteed by labor unions. Not even a government can create jobs for long except under certain conditions. In a dictatorship or under fascism, jobs can be given to every worker. But then the workers become the slaves of the state. They must take the jobs assigned them, together with the hours, conditions, and wages which go with them."

"In a democracy of free individuals, this freedom also involves the responsibility of creating jobs. Every individual must contribute to this process. A nation which encourages its citizens to wait for jobs to which they have a right will find its population increasingly unfit either to get or to hold jobs."

From "The Rediscovery of Man," by Henry C. Link, Ph.D. By permission of The Macmillan Co., Publishers.

The effect of road construction without proper drainage facilities in causing erosion along the highways and on adjacent farm lands is described on page 7.

CONTROLLING HIGHWAY EROSION



1. Highway Drainage Cuts a Gully and Undermines a Fence Along a Roadside in Arkansas. 2. The Same Roadside After Filling in and Sodding, With the Fence Set Back for the Fourth and Last Time. 3. Florida Uses a Dry-Rubble Side Ditch, Well Off the Highway, Which Is Both Attractive and Effective in Preventing Erosion. 4. Lining a Side Ditch With a Pre-Mix of Cut-Back Asphalt and Local Sand on a Vertical Curve in

Florida. 5. A Road Ditch Along a Texas Highway Has Become a Deep Gully. 6. The Same Gully After the Banks were Sloped and Sodded With Bermuda Grass. This Treatment Protects Both the Road and Adjacent Farm Land Against Erosion. (Photos 1, 2, 5 and 6 are reproduced through the Courtesy of the U. S. Soil Conservation Service; Photos 3 and 4, by Courtesy of the Florida State Road Department.)

Diesel Package Units**Make Fords into Diesels**

The Buda-Lanova diesel conversion unit for Ford motor trucks for the years 1933 to date, recently announced by the Buda Co., Harvey, Ill., consists of a standard 4-cylinder Buda-Lanova diesel with 3 $\frac{3}{4}$ -inch bore and 5 $\frac{1}{4}$ -inch stroke, identical in mounting dimensions with the standard Ford V-8 engine, and the one extra part required to make a complete change-over. No major changes

in the Ford V-8 chassis frame or assembly are necessary.

Complete details on this new diesel power plant package unit are contained in a new catalog, copies of which may be secured direct from the manufacturer by mentioning this magazine.

Concrete Wheelbarrows

The No. 68 Toledo concrete wheelbarrow, designed for profit loads, as well as other material-handling wheel-

barrows made by the Toledo Wheelbarrow Co., Toledo, Ohio, is described and illustrated in the catalog issued by that company. The No. 68 has a capacity of 5 cubic feet, weighs 32 pounds, and has heavy channel-steel legs with renewable shoes. Iron cross bars over the frame and under the tray give added strength and support. These wheelbarrows are regularly equipped with a steel wheel but all barrows can be pneumatically at extra cost.

Copies of this catalog on the full line

of Toledo wheelbarrows for all types of construction jobs may be secured direct from the manufacturer by mentioning this item, or from this magazine.

New Gilmore Sales Mgr.

The appointment of W. A. Huber as Manager of Sales of the Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp. has been announced. Mr. Huber has been with Jones & Laughlin since 1936.

LORAIN Scoops THE Field

with the NEW
LORAIN-79
1 $\frac{1}{2}$ -YD. SHOVEL
25-TON CRANE

FEATURING

ALL-WELDED SHOVEL BOOM
Here's the strongest boom ever placed on a Lorain machine—a 23' all-welded boom of entirely new construction. Its Center Drive design makes for greater ranges, too, as proved by the fact that the Lorain-79 can dig practically 29' high with boom at 50°.

DOUBLE CENTER DRIVE TURNABLE
And we do mean "double." Improved Center Drive design uses double pinion to send a greater flow of power into the hoist shaft equipped with bigger drums and more cable capacity. Add to this simplicity of construction and direct application of power and there's your answer to a turntable design that can really give and take.

CENTER "CHAIN" DRIVE CRAWLER
It's longer, wider, heavier, stronger—yet the 2-speed Center "Chain" Drive Crawler moves the 1 $\frac{1}{2}$ -yd. Lorain-79 around with the agility of a 3 $\frac{1}{2}$ -yd. unit. It will roll this 87,000-lb. machine right up a 30% grade—travels or steers in either direction. Watch it perform and you'll agree it has everything you ever wanted in a crawler—and then some.

For the complete story (and it's a good one) on the Lorain-79, write today for new catalog.

Plus

- ✦ Automatic Power Dipper Trip
- ✦ Automatic Crowd Brake
- ✦ All-Welded Dipper Stick
- ✦ Crawler Travel and Safety Lock
- ✦ Rustproof Tread Adjustment
- ✦ Two-piece Swing Drums with Reversible Clutch Bands
- ✦ Simultaneous Hoist... Swing and Travel



THE
THEW SHOVEL COMPANY

LORAIN, OHIO



The New LeTourneau Sheepsfoot Roller, Made in Sections, Is Flexible to Follow the Contour of Uneven Terrain and Give Compaction at All Points

Newly Designed Feet For Sheepsfoot Roller

A sheepsfoot roller with newly designed feet of reported greater compacting efficiency, and with hinged drums to allow the rollers to follow the contour of uneven ground and still give uniform compaction, has been announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. The drum sections are 3½ feet in diameter and 5 feet long. Due to the method of hinging, any drum in the roller may be interchanged with any other drum. Thus a two-drum roller may be converted into a four-drum roller and vice versa.

The tamping feet are not the conventional straight-shaft type but are tapered, a special design that permits stronger base construction and makes it more difficult for the feet to become clogged. Because of the shape, they enter the new fill material easily, give maximum compaction, and pull out of the ground without kicking or tearing up the newly rolled material, according to the manufacturer. These feet are 8 inches in length, giving deeper penetration, and have a larger area welded to the drum, adding to their structural strength.

Construction efficiency is reported increased by combining sheepsfoot rollers with a bulldozer. Real operating economy is effected as one operator and one tractor are able to handle both

pieces of equipment. In addition, different arrangements of the LeTourneau rollers are possible from tandem and triple line rolling to long single line operation.

New A-C Equipment Offered for 1939

One of the four additions to the Allis-Chalmers line of construction equipment, offered for 1939, is the Speed Maintainer, a high-speed maintenance unit designed especially for state, county and township road maintenance as well as for all types of light grading. This unit is a medium-size rubber-tired wheel tractor with a 9-foot blade mounted perpendicular to and in the approximate center of the wheelbase. From a comfortable seat, the operator of this one-man unit controls the blade by rotating two large hand wheels. The moldboard is mounted on a centerless circle and is adjusted to the proper angle merely by changing two bolt positions. The blade



The Allis-Chalmers Speed Maintainer

assembly drawbar is attached at the front of the tractor, leaving the standard drawbar unobstructed. Speeds include 9.75, 4.75, 3.5 and 2.5 mph forward and 2 mph reverse. The power plant is a heavy-duty valve-in-head 4-cylinder engine fitted with removable cylinder liners and valve seat inserts. Lubrication is by

the full pressure system. Either gasoline or distillate can be used and consumption is only ¾ to 1 gallon an hour on the heaviest work, according to the manufacturer.

Another addition to the A-C line is the B-15 gasoline power unit, a small 4-cylinder valve-in-head unit rated at 15 hp for continuous duty service requiring 1,400 rpm. Higher horsepowers are available with this same engine for special applications. All parts of the engine are lubricated by the forced feed system, a high-tension magneto is provided, cooling is effected by a high-capacity fan-belt-driven circulating pump, and cylinder liners are of the removable type. The B-15 is designed for use with pumps, small saws, concrete mixers, vibrators, and other power tools.

The pusher bumper for loading tractor-drawn scrapers and the gasoline Model S tractor, announced late in 1938, are the two other additions to the construction equipment made by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis.

LITTLEFORD

84-HD TAR AND ASPHALT KETTLE

The Littleford 84-HD Kettle was designed to give to tar and asphalt kettle users a more efficient piece of equipment.

The patented features, "Double Heat Circulation" and "Screened Reservoir," make the 84-HD the fastest heating kettle and the only kettle to give a continuous flow of hot materials at all times.

In addition to these patented features, a Littleford Kettle with a Hand Spray or Motor Spray Attachment will speed up maintenance work and assure deep penetration of materials. The 84-HD Kettle will trail behind a maintenance truck as fast as the truck will go. For more details on the Littleford 84-HD Kettle, write

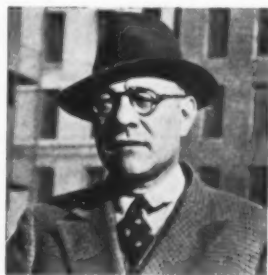
LITTLEFORD BROS.

485 E. PEARL ST.

CINCINNATI, OHIO

<p>HAND SPRAY ATTACHMENT FOR SPEEDY APPLICATION AND DEEP PENETRATION</p>	<p>PATENTED "DOUBLE HEAT CIRCULATION" MAKES THIS KETTLE HEAT FASTER</p>	<p>PATENTED "SCREENED RESERVOIR" KEEPS A CONTINUOUS FLOW OF HOT MATERIALS</p>
		<p>COLD MATERIAL SEPARATING SCREEN CONTINUOUS FLOW OF MATERIAL HEAT CHAMBER</p>

Men Who Are Doing Things



Meet

A. G. Sperl, Superintendent for the George J. Atwell Foundation Company.

Mr. Sperl can look back 26 years to his first experience with Wellpoints. He has been constantly engaged in heavy foundation work on aqueducts, dams, subways, etc., since 1910 including, more recently, foundations for Federal Office Bldg., Sheffield Farms Bldg., Radio City, sections of the West Side Highway and Henry Hudson Pkwy., all built by the Atwell Co., in New York City.

During the War, Mr. Sperl supervised construction of the water and sewage disposal systems at Camp Meade, and from 1919 to 1931 was with Spencer, White and Prentiss, Inc., on difficult foundation work throughout the United States.

Mr. Sperl used Griffin Wellpoints to de-water the foundations for the Federal Office Building in 1935-6 and again in 1938 on the Sheffield Farms Building.

GRIFFIN WELLPOINT CORP.
725 East 140th Street, New York City
Telephone Metrose 8-7704-8

Erosion Created By Road Building

**Lack of Understanding
Of Natural Drainage Has
Damaged Highway Ditches
And Adjacent Property**

(Photos on page 4)

★ A WORD of warning to highway engineers is contained in a pamphlet recently published by the Soil Conservation Service of the Department of Agriculture. Highway construction itself, by its artificial changing of water courses, may be responsible for much of the problem of erosion. Arnold M. Davis, Agricultural Engineer, points out that unless special precaution is exercised in the protection of natural drainage ways and the design and location of culverts, the run-off from roads will cut gullies into land along the roadways, depositing the eroded material on good agricultural land.

Road Drainage Destroys Farm Land

There are over 3,000,000 miles of public roads in the United States. These roads necessarily cut the terrain at all angles and divert run-off from its natural flow. In recent years highway engineers have made considerable progress in controlling the run-off from state and Federal-Aid roads. County and township roads, however, have been neglected. These roads, built to serve a local community, are old trails that have been improved with road graders or scrapers and surfaced to facilitate the slower moving vehicular traffic. Many of these local roads, and there are 2,684,570 miles of them, are severely damaged by erosion and in need of repair and they are often the most damaging to adjacent agricultural land.

Farm Run-Off Also Destroys Roads

Not only does run-off from roads damage farm land, but run-off from farm land destroys roads. The deep gullies that form in highway ditches often can be attributed to the action of uncontrolled run-off from land adjoining the road. Land owners in some communities are responsible for erosion on highways because they have used the highway ditch as an outlet for a terrace system without consulting road officials and without providing any protection against erosion in the highway ditch.

Erosion Increases Maintenance Cost

When modern highways are constructed through rolling country, it is necessary to cut through the hills and fill the valleys in order that the public may be provided with a highway that can be traveled safely under all conditions. These highways have low gradients and improved alignment and cross-sectional designs exposing large areas of subsoil that are susceptible to erosion. These exposed areas must be covered with vegetation that will prevent erosion on the rights-of-way. This planting should be done during the original construction period in order not to increase the burden on the maintenance department. This is being done most effectively by many state highway departments through roadside development programs. Improved culvert designs that prevent erosion are being introduced, and special designs are being developed to fit local conditions, such as drop inlets and checks to permit silt to settle out and rebuild eroded drainage ditches.

County officials usually have only small appropriations for relocation, repair, or improvement of county and township roads. They are further handicapped by the lack of information as to how they can most effectively check

erosion on their highways, and a few may not even realize that erosion is causing most of their highway maintenance and repair cost. Sufficient funds are not available to county road departments to enable them to solve all the problems that confront them. The maintenance of the surfaces is of primary importance. If funds are available after this expense has been met, they may be used advantageously to repair damage caused by erosion and to establish protective measures, provided adjacent land-owners cooperate.

Cooperation is the only way to solve the erosion control problem, since run-off from farm land destroys roads just as run-off from roads cuts gullies on farm land. Both farmers and the public will benefit materially if land owners and highway agencies work together to protect road ditches. An unprotected road ditch may become a gully that will seriously damage the highway and adjacent farm land as well as be a hazard to those using the road. It costs

(Concluded on page 25)

A Striking Showing Of Night Road Signs

In an endeavor to bring the effectiveness of their reflecting material for road signs to the attention of highway engineers, Prismo Safety Corp., Division of John R. Wald Co., Huntingdon, Pa., arranged a novel visualizer for the San Francisco Road Show. This large tunnel-type demonstrator showed, under actual automobile lighting conditions, highway scenes in true proportion. Miniature bridges, underpasses, road intersections, traffic circles and other types of road engineering were included and each properly marked with the correct form of warning sign and marker in true proportion.

All of the markings, road stripings and signs were Prismo-treated for greater night effectiveness. The process consists of a special type of pigmented binder in which are embedded countless miniature glass spheres to half of their circumference. These serve as reflecting lenses under the beam of headlights.

Those viewing the scene could judge the effectiveness of this type of marking on signs, as well as on vertical surfaces such as underpasses, bridges and barricades where flexible Fibreglas treated with Prismo spheres was also used as it would be employed as temporary marking.

SIMPLE RUGGED DEPENDABLE

CONSTRUCTION EQUIPMENT

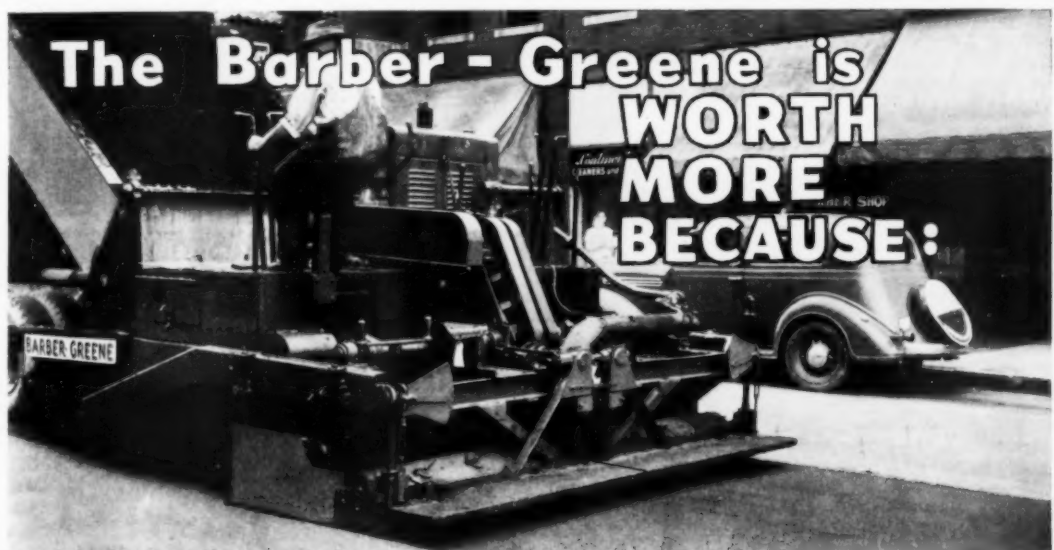


Built especially for use on construction work, Sterling pumps are used and highly recommended by contractors everywhere.

Write Today for Literature and Prices

Sterling

MACHINERY CORPORATION
431-13 Southwest Blvd. Kansas City, Mo.



It Tamps and Levels Simultaneously

Loosely struck off material is bound to compact more in the thicker mat portions. The Barber-Greene automatically puts all of the COMPACTED material needed into the low spots—thus retaining the level surface under rolling and traffic.

It Levels Without Forms

The Barber-Greene lays a level surface even over an irregular subgrade. Its ingenious leveling principle is so far superior, it is not to be compared with the long wheelbase principle.

It has Full Crawler Traction

Almost invariably a bituminous Finisher is operating on a slippery primed surface. Crawlers are essential for positive traction. Positive traction is essential for accurate steering. Perfect steering is essential for a straight mat.

Its Hopper holds 5 Tons

The hopper of the Barber-Greene easily holds 5 tons, and unloads itself by power. The material is not dumped on the ground ahead, consequently the machine does not stall. The feeders and spreading screws are under complete control of the operator, eliminate all hand spreading.

It lays All Materials

Not only does the Barber-Greene lay all types of bituminous material, it has actually established a new standard of excellence for the more difficult materials such as sheet asphalt.

It was Designed for Resurfacing

The toughest bituminous job is Resurfacing. It usually requires working over an irregular surface. It sometimes requires very thin mats, and accurate thickness control—sometimes working to grade. The Barber-Greene meets these and the many other exacting requirements of Resurfacing. Consequently, it is superior on New Construction, City Streets, Airports—in fact every phase of bituminous construction.

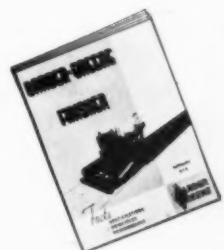


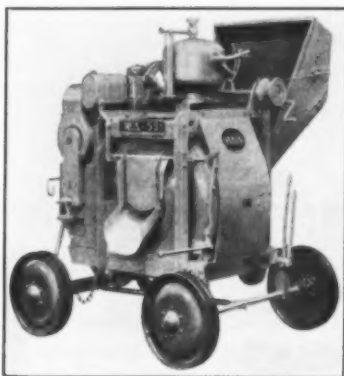
**BARBER
GREENE**

485 West Park Avenue
Aurora, Illinois

Get Your Copy

The new 36-page catalog on the Barber-Greene Tamping Leveling Finisher clearly describes the principles of operation, illustrates the many accomplishments with job photos, explains the features, and gives complete specifications. You should add the interesting contents of this booklet to your present knowledge. Write for your copy. There is no obligation.



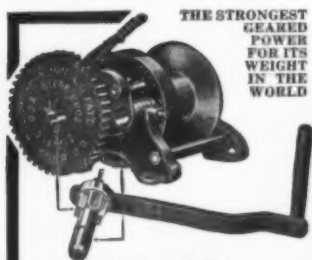


One of the New Rex Mixers

New Line of Mixers

A complete new line of Rex concrete mixers in the 3½-S, 5-S, 7-S and 10-S sizes has been announced by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. The 5-S is made in a two-wheel end-discharge and a four-wheel side-discharge style and is powered by a 6-hp single-cylinder air-cooled engine. The 7-S is available in a two-wheel end and four-wheel side-discharge model and may be powered by a one-cylinder or a four-cylinder air-cooled engine. The 10-S mixer is made in a two and a four-wheel end-discharge and a four-wheel side-discharge model powered by either standard or heavy-duty four-cylinder engine. All of these mixers, which can be furnished with steel, solid-rubber or pneumatic-tired wheels, can be equipped with the new Rex batch meter and the new Rex self-priming centrifugal water pump. These new 1939 Rex mixers are streamlined in design and are painted bright Persian orange for better prolonged appearance in the field.

The 5, 7 and 10-S mixers have the conventional-type Rex mixing drum of rugged all-welded construction with pressed steel drum heads and center strip welded together. The mixing blades and buckets are made of high-carbon steel. Each machine has full-view one-man end controls to enable the operator to handle both skip and discharge without moving from his station. Another feature is the Rex Shimmy Skip, the patented shaking action which hurries the batches down the streamlined skip into the drum. The discharge chute, which remains completely outside the drum opening while mixing is taking place, is swung into the extra-large drum opening only for discharge. The new Rex water tank and non-bypass valve meets water specifications for all mixes, according to the manufacturer. These three models are driven by all-steel Rex Chabeleco chain with case-hardened pins and bushings, heat-treated rollers and side bars.



THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

ALL STEEL HAND HOIST

SEATTLE, U.S.A.
COMPACT—POWERFUL—SAFE
 "For use where power is not practical or available"
 Manufactured in 2, 5 and 15-Ton Sizes.
 For capacity comparison, 1½" cable used:
 2-Ton "Lightweight"..... 75 ft.
 5-Ton "General Utility"..... 250 ft.
 15-Ton Triple-Geared "Special"..... 1200 ft.
 Patent instant gear change and positive internal brake that never fails, and will lock load.
 Price, f.o.b. Seattle
 Gear Ratio Weight
 2-Ton 4, & 22 to 1..... 60 lb. \$ 50
 5-Ton 4, & 24 to 1..... 110 lb. \$ 75
 15-Ton 4, 19 & 199 to 1..... 680 lb. \$250

BEEBE BROS.

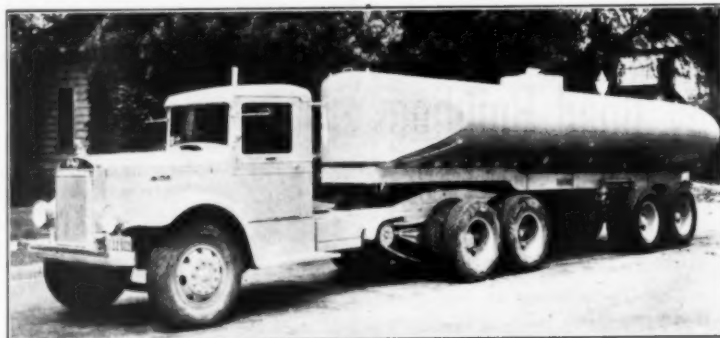
2724 6th Ave., So., SEATTLE, WASH.
 Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete literature and list of dealers in principal U. S. cities and foreign countries gladly mailed.

The 3½-S tilting mixer retains its present design but has a number of refinements. The front foot is adjustable horizontally to enable the machine to remain in a true upright position although standing on uneven ground. The towing tongue is of a new telescopic design which clicks firmly into place in towing or mixing position. The tilter retains its fast mixing action with a three-blade drum, modern power, Rex Grip-lock chain drive, Timken-bearing drum-drive pinion shaft, Timken tapered-roller-bearing spindle, and the all-welded all-steel frame.

New Generators

At A.R.B.A. Show

The new Sterling Unitype electric-generating plant of 1,000-watt capacity was displayed by the Sterling Machinery Corp., 411-13 Southwest Blvd., Kansas City, Mo., at the A.R.B.A. Highway Exhibit in San Francisco this month. This new line of close-coupled electric-



Covering a 300-Mile Area in the San Joaquin Valley, This Tandem Fruehauf Tank-Trailer, Powered by a Mack Truck, Hauls and Spreads 5,800 Gallons of Road Oil. The Unit Was Recently Purchased and Put Into Operation for Road Maintenance by Fresno County, California

generating plants includes units ranging in size from 100 watts, 6 volts, up to and including 1,500 watts, 220 volts.

The plants are of sturdy construction and are adaptable for mounting on portable transmitters, cranes and shov-

els, for use in construction camps and field repair shops, for service trucks and for any other service requiring a portable generating plant.

Information on these new units may be secured from the manufacturer.

Speed-o-Matic

SHOVEL - DRAGLINE - CRANE

"Easy to run and does more work" Says operator Emery Potter-



● "I have operated most of the leading makes of Shovels and Cranes in the last 15 years, and can truthfully say, in reply to your inquiry, that I prefer the Link-Belt Speed-o-Matic K-45, that I have been running for the Parlor City Construction Company.

"It is a good tough machine that has given us no mechanical trouble, and I have been able to satisfy the contractor 100%.

"There is a lot to being comfortably seated, and having short, easy-throw levers under your fingers; instead of being obliged to reach for long levers and wearing yourself out in doing it all day long.

"The Speed-o-Matic is so easy to run and makes it possible to do so much more work, that I don't know what more an operator or owner could ask for."

Emery Potter

LINK-BELT COMPANY
 300 West Pershing Road, Chicago

Distributors and Offices in Principal Cities



LINK-BELT



A Temporary Bridge For Heavy Traffic

**Structure at Darien, Ga.,
To Be Used for Two Years
During Construction of
High-Level Span**

♦ THE old wooden bridge at Darien, Ga., one of many bottle-necks on the Coastal Highway, U.S. 17, between Savannah, Ga., and the Florida line, a distance of 126 miles, is to be replaced with a steel high-level bridge permitting four lanes of traffic. The obsolete structure over Darien Creek, a little navigated tidal stream, was scarcely wide enough for two ordinary automobiles to pass, and when large buses, fruit trucks, or one of the stream of trailer houses crossed the bridge it was one-way traffic—or else! For three years this and other bridges on this through route have been operated as one-way bridges.

The temporary bridge will accommodate traffic for two years and is an excellent example of substantial design and construction to insure safe movement of heavy passenger, pleasure, and freight traffic during the construction of a permanent structure.

Contract Construction

The temporary bridge was designated as State Aid Project 195-McIntosh County which covers the building of a detour bridge at the south limits of Darien. The bridge was let by contract and awarded to the Espy Paving & Construction Co. at a contract price of \$22,895.00. Bids were received December 17, 1937, construction started January 4, 1938 and was completed April 9, 1938. The bridge is 1,615 feet in length and carries a 20-foot clear roadway. It consists of 105 spans 15 feet long and one span 70 feet in length across the main channel. There are two timber end bents and one 4-foot timber bulkhead.

Substructure

The substructure consists of untreated timber piles ranging in length from 30 to 72 feet, totaling 20,000 feet. The piles were designed to have a minimum bearing capacity of 15 tons. In accordance with Georgia Highway Department specifications, the bridge was built with a special double-pile bent at the channel to hold the I-beam span.

Each bent is double sway braced, consisting of four 3-inch x 10-inch x 23-foot pieces, and also one sash brace 3 x 10 inches x 22 feet long. The alternate panels have longitudinal bracing consisting of two pieces to the side 3 x 10 inches and 23 feet long. The longitudinal bracing was used where the vertical height from the ground to the bottom exceeded 15 feet, which was also

the case for the double sway bracing. Single sway bracing was used when the height was under 15 feet. The bulkhead material at each end consists of 4 x 8-inch boards and was designed for a height of only 4 feet.

The design for loading was for two typical 10-ton trucks with no allowance for impact. The piling attained a penetration of 20 to 35 feet. Each intermediate pile bent has four piles spaced 5½ feet on centers and the end pile bent is spaced 6½ feet from the regular piles. Each bent is capped with a 10 x 12-inch timber 20 feet 3 inches long and drifted with a ¾-inch round 20-inch drift pin.

Superstructure

On the caps were placed 4 x 12-inch



C. & E. M. Photo
Spraying Pine Tar on the Deck and Hub Guards of a Temporary Bridge at Darien, Ga.

joists 16 feet long, 14 lines to the span, and nailed to the caps with two 60d nails. The flooring consists of 4 x 8-inch planks sized on one side and with one edge fastened to each joist with two 60d nails. The joints in the flooring are staggered.

The hub guards consist of 6 x 8-inch timbers fastened securely to the hub-guard blocks, also of 6 x 8-inch timber, with twelve to the panel. There are four hand-rail posts to the panel, two on each side measuring 4 x 6 inches in cross

(Concluded on page 43)



**SEMI-PORTABLE OUTFIT
CRUSHES 80 TONS HOURLY**

Here's a semi-portable quarry plant that "crushes more stone in a ten-hour shift than any other plant in North Carolina," according to Lee G. Smith, who was in charge for the owner, Nello Teer of Durham, N. C.

The plant has just finished crushing 40,000 tons of minus 1½-in. rock for a new road on Route 152, North Carolina, for the State Highway and Public Works Construction. The rock there is a very hard granite, but this sweet-running Tel-smith Crushing Plant kept right on turning out its 800 tons of minus 1½-in. every ten-hour shift.

So smoothly has it operated that not once was there a mechanical failure, and no productive time was lost during the entire job. Typical Tel-smith performance!

The new road extends 9½ miles between China Grove and Rockwell, small towns near Salisbury, N. C.; and is 30 ft. wide at the fills and 35 ft. wide in the cuts. All of the rock had to be minus 1½-in., with about 35 per cent minus ¾-in. material. The engineer for the state was G. H. Ehringer.

The rock was hand-loaded into skip pans. Thirteen trucks, each hauling four tons a trip, brought the skip pans to the coarse crusher, a No. 13-B Tel-smith Gy-ratory Crusher. After crushing, a 24-in. x 68-ft. latticed steel frame Tel-smith Portable Belt Elevator carried material direct to a 4-ft. x 10-ft. Tel-smith Triple Deck Pulsator.

Oversize from this vibrating screen was chuted to the secondary crusher, a No. 36 Tel-smith Gy-rasphere Crusher; and a 24-in. x 38-ft. Tel-smith Portable Conveyor took the re-crushed material back to the main conveyor for re-screening. A 95 hp. Diesel engine drove the entire plant. Six men took care of all maintenance and operation, including feeding the primary crusher and loading trucks from the bin.

Tel-smith builds rock crushing and gravel washing plants of all sizes and types—portable, semi-portable and stationary—designed to fit your conditions and equipped for faster production, lower upkeep and more profitable operation. You'll want details... Write for free Bulletin Q-34.

SMITH ENGINEERING WORKS
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Cable Addresses: Sengworks, Milwaukee — Concrete, London
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211 W. Wacker Drive
Chicago, Ill.
81 Binney Street
Cambridge, Mass.
Rundels M. & S. Co.
Louisville, Ky.

TELSMITH

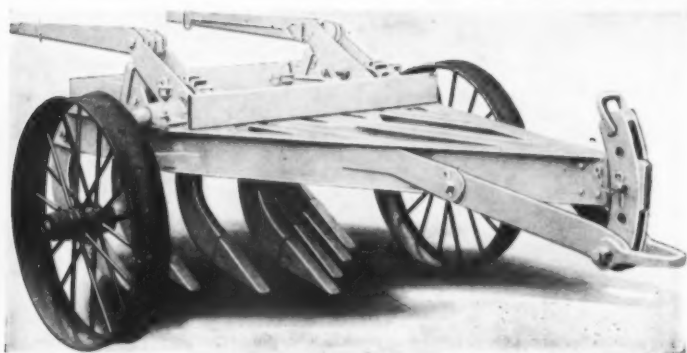
HAUCK HEATING & MELTING EQUIPMENTS OIL BURNING

For Bridge, Building, Paving, Pipe Line,
Highway, Sewer, Water and Railroad
Construction and Maintenance.

- Tar and Asphalt Melting Kettles
- Asphalt Surface Heaters
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- Burners for Road Oil Distributors
- Pipe Joint Compound Kettles
- Lead Melting Furnaces
- Torch Burner Equipments
- Rivet Heating Forges
- Weed Burners
- Asphalt Plant Burners

Write for Catalogs and Prices

HAUCK MANUFACTURING CO.
116-126 Tenth St. Brooklyn, N. Y.



The K & J No. 1 Road Ripper

A New Road Ripper

A new machine for grading, reshaping and ripping up old or new roads, designed by a road contractor with more than 30 years' experience, has just been announced by the Case Crane & Kilbourne Jacobs Co., Columbus, Ohio. Equipped with seven removable high carbon steel standards with reversible manganese-steel slip-on points, this No. 1 K & J ripper is so designed that 2, 3, 4, 5 or 7 teeth may be used. The tractor hitch is adjustable so that the frame is kept level at different depths of teeth, to insure uniform ripping.

Operation for depth of cut is by means of two levers and as the axle is in two parts, either side can be raised or lowered independently, thus allowing for uniform depth of cut from nothing to 21 inches, or from nothing on one side to 21 inches on the other side. One or both sides can be raised or lowered while in use so that none of the teeth will cut below the base of the grade. The wheels have wide concave tires to prevent sliding and are placed to provide balance when in travel position and swing to the rear through the center line of the rip.

Bulletin 3069 describing the No. 1 K & J ripper, as well as the other road-building products made by this company, may be secured direct from the manufacturer by mentioning this magazine.

The Caterpillar Line

A composite catalog covering the entire Caterpillar line, including track-type tractors, motor, blade and elevating graders, terracers, diesel engines and diesel electric-generator sets, has been

machines and the third with diesel engines. Brief specifications and operating data about every product built by this company are included.

New Truck Models

During the A.R.B.A. Highway Exhibit in San Francisco this month, two new FWD units were exhibited by the Four Wheel Drive Auto Co., Clintonville, Wis. The Model HG is designed especially for highway maintenance service, while the Model T-32 is designed for semi-trailer service in the hauling field.

The Model HG, powered with a 6-cylinder 91-hp engine with $4\frac{1}{8} \times 4\frac{3}{4}$ -inch bore and stroke, is suitable for all-year round highway service both for road blading and grading and for snow removal during the winter months. A straight frame is now used in the chassis and the unit has larger brake drums. With the motor operated at governed speed, the truck has a low-gear road speed of approximately 4 mph and a

high-gear speed of 33 mph. As in all FWD's, the driving mechanism is fully enclosed, including the life-time front-axle steering and driving knuckles, and full-floating axles. A shock-absorbing silent chain in the transfer case and the FWD center differential are designed to relieve all unnecessary driving strain. A special feature of the HG is the height under the center of the truck providing clearance for an underbody grader or scraper mounting, without increasing the body mounting height. A new type of underbody blade is held in constant cutting position and under constant control by levelizers and the action of hydraulic rams.

The Model T-32, powered by a 6-cylinder engine with bore and stroke of $4\frac{1}{8} \times 4\frac{3}{4}$ inches and developing 90 hp, rounds out the FWD line for semi-trailer service. This new unit has a gross vehicle weight rating of 32,000 pounds. The chassis frame is of heat-treated high-carbon steel, and standard equipment includes 8.25 x 20-inch tires, single front and duals rear.

PRISMO

The truly economical Safety Measure

If you are interested in reducing night traffic accidents we urge you to write at once for complete information on

PRISMO LIFE-LINE ROAD STRIPING and PRISMO-treated Highway Signs

In addition to these time-tested, state- and government-approved methods of cutting down the accident ration we announce

PRISMO PERMI-BASE

(see illustration below)

in rolls of standard width up to 24" in glistening white or brilliant yellow. Again the Prismo Process has, as with the other spectacular Prismo products, introduced millions of tiny glass spheres in a special binder on a new basic material which is flexible and durable. This product has an all-around use. You can apply it anywhere. Prismo PERMI-BASE has been perfected by outstanding chemists who have also compounded a weather-proof, moisture-proof adhesive for applying it.

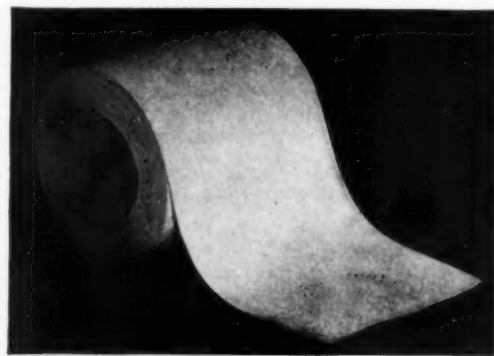
Particularly designed for use on obstructions, temporary hazards, posts, abutments, truck bodies, bumpers, railroad gates, etc. It is easy to handle, quick to set permanently, is extremely flexible so that it can be applied to curved or flat surfaces.

ATTENTION — MEN OF SAFETY!

Fleet-owners, road contractors, state and county engineers, city officials, bridge builders, maintenance men everywhere, send for samples today. Let this flashing new PRISMO product serve you. We'll gladly send samples and set facts before you!

PRISMO SAFETY CORPORATION

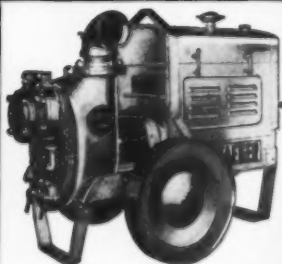
Division of John R. Wald Co.
HUNTINGDON, PENNA.



NEW • ECONOMICAL • PRACTICAL
FOR MANY USES



BUYING A PUMP?

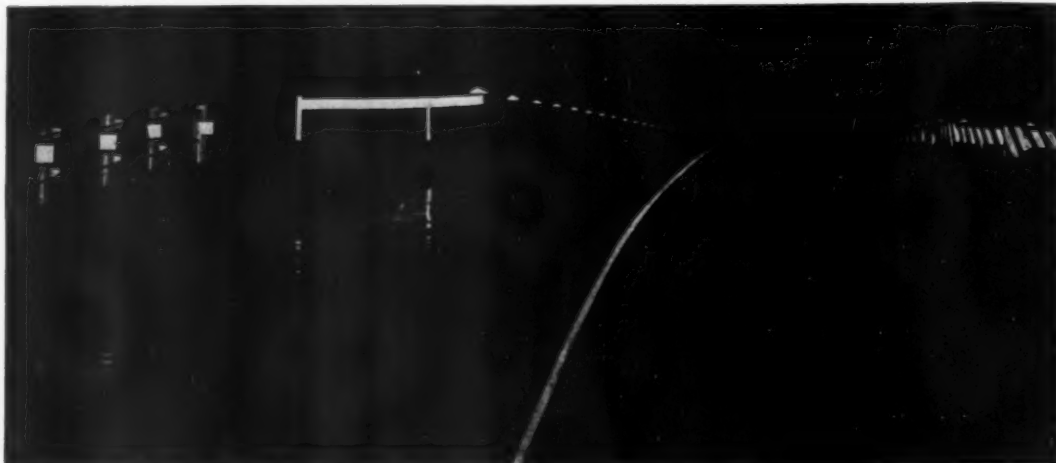


INSIST ON:

- Faster, 100% Automatic Priming
- Greater Efficiency in Any Size, at Any Lift
- Thousands of Hours of Heavy Duty Service
- Cut your Costs with "Sure Prime" Pumps—1½" to 10" Sizes, Capacities 4000 to 220,000 G. P. H. Send for New Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER



D. B. S. T. a Success On Alabama Roads

(Continued from page 1)

checked with a 22-foot crown template. Two miles of the first base course was completed before the contractor doubled back for the second course.

The second base course was identical with the first except that the diskings were done 1 inch into the first base course to bond them. The second base course was maintained under traffic for 30 days with maintenance blading.

The final shaping was done with a Caterpillar No. 11 Auto Patrol and a complete soaking of the surface to permit accurate shaping which was constantly checked with the 22-foot template.

The Bituminous Treatment

When the finished surface had dried, it was cleaned thoroughly of loose material and dust by a Hough rotary broom and blower mounted on an International T40 TracTracTor and then shot 23 feet wide with 0.35 gallon per square yard of Barrett tar with the contractor's new Kinney air-controlled 1,000-gallon distributor mounted on a Ford truck. Two men followed up the distributor and broomed the joints and any places where the dust had prevented the tar from penetrating the road surface. Where it was necessary for traffic to cross the new road at junctions with the old road used for the detour, the prime was sanded to prevent pick-up of the material by vehicles. The road was closed to all traffic for at least three days. Then when there was no pick-up of the prime material it was opened for a minimum of seven days to traffic annealing. All spots where there was still a slight pooling of the tar prime were sanded.

The tack coat was 0.40 to 0.45 gallon per square yard of Standard Oil Co. of Louisiana 150-200-penetration asphalt applied at a temperature of 275 to 350 degrees F. with the same distributor and for a width of 22 feet. The trucks with the 1 1/4-inch to No. 4 sieve slag and with spreader boxes built into the tail-gates were backed onto the tack coat at once and the slag spread at the rate of 0.5 cubic foot per square yard. This was rolled at once with a 7-ton Galion roller to key it into the warm asphalt, during which it was dragged with a gang broom pulled by a truck and hand-broomed to make a uniform surface.

This mat was held under traffic for 14 days and then swept with the rotary broom to remove all loose stone which was stockpiled along the edge. The surface was shot with 0.15 to 0.20 gallon per square yard of SC-2 and fine slag from 1/2-inch to 16-mesh spread at the rate of 0.25 cubic foot per square yard from the spreader boxes. This was drag-broomed and as quickly as possible was shot again with 0.20 to 0.25 gallon of the SC-2 and closed for 48 hours. Then it was ready for traffic as a completed surface treatment.

Personnel

This 10.5-mile double bituminous surface treatment contract was awarded to the Vandigriff Construction Co. of Montgomery, Ala., on its low bid of \$187,937.98. H. L. Vandigriff, owner of the outfit, was in personal charge of the work, with D. B. Chapman as General Superintendent on base, and J. L. Bryan as Bituminous Superintendent. For the Alabama State Highway Department, F. H. Powe was Resident Engineer.

Handy Tool of Many Uses

A new 64-page catalog on the line of Handee tools of 1001 uses has recently been issued by the Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago,

Ill., from whom copies may be secured direct by mentioning this magazine. The standard Handee electric tool, for which over 200 accessories have been designed, grinds, drills, cuts, carves, sands, saws, sharpens, cleans and routs. The many uses of the Handee tool are described and illustrated, and the various accessories depicted.

New Dempster Dealer

Announcement has been made by Dempster Bros., Inc., Knoxville, Tenn., of the appointment of Cornell & Mathews, Wilmington, Delaware, as distributor for Dempster-Dumpsters in the territory including Delaware, Maryland, District of Columbia and Virginia. The new firm of Cornell & Mathews is made up of O. H. Perry Cornell, Sales Manager, who was formerly associated with the Du Pont Construction Co. for a number of years, and John W. Mathews, Secretary and Treasurer, formerly in the Engineering and Sales Departments of the Atlas Powder Co.

South Bend

31
YEARS
EXPERIENCE

BITUMINOUS DISTRIBUTORS

MAINTENANCE UNITS For Bituminous Surfaces

STREET FLUSHERS - STREET SPRINKLERS

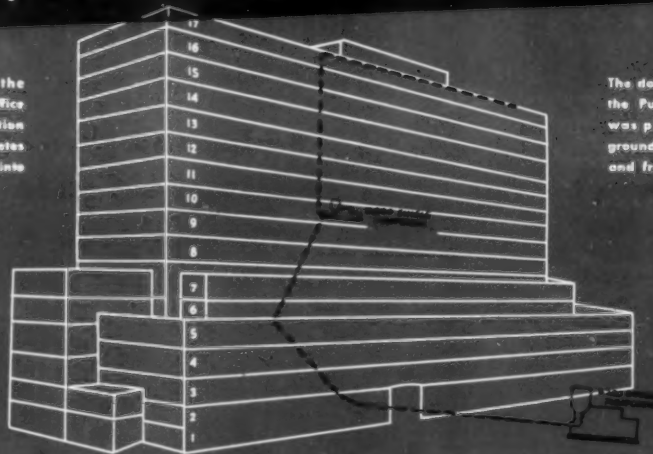
GUTTER SNIPE Pickup Sweepers

TRAFFIC LINE MARKERS

MUNICIPAL SUPPLY COMPANY SOUTH BEND, INDIANA

REX PUMPCRETE HELPS GEORGE A. FULLER COMPANY OUTBID THE FIELD FOR \$7,000,000 LOS ANGELES POST OFFICE JOB!

Skeleton drawing of the new Los Angeles Post Office Building, showing location of the two Rex Pumpcretes used to pump concrete into the forms.



The dotted line shows how the Pumpcrete's pipe line was placed between the ground and 10th floor levels and from the 10th floor to the 17th.

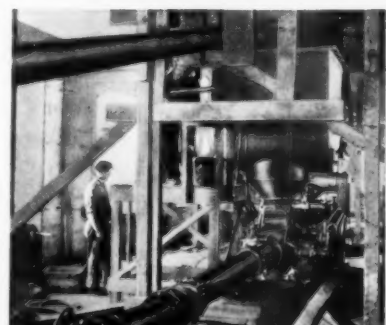
SETS RECORD BY PUMPING CONCRETE UP TEN FLOORS!

● All new records for pumping concrete vertically were smashed when the Rex 200 Double Pumpcrete, operated by the George A. Fuller Company, pumped 400 yards of concrete in less than 7 1/2 hours to the 10th floor of the new Los Angeles Post Office—136 feet above the Pumpcrete itself! But that's not all, on the 10th floor was another Pumpcrete—a 200 single—which after the 11th floor was completed, repumped the concrete to the last 6 floors!

It is performance like this that convinces experienced contractors that the way to get their share of present-day concrete jobs is to submit bids which include the cost of placing concrete with the Rex Pumpcrete. For the Rex Pumpcretes, by eliminating the need for towers, hoists and buggy runs, and by giving consistent delivery of from 15 to 65 cubic yards of concrete into the forms every hour, cut placement costs to new lows.

There are Pumpcretes built for all classes of concreting work, for jobs of 1500 yards or 100,000 yards of concrete—or more. Before you bid, see how they will help you outbid the field!

CHAIN BELT COMPANY OF MILWAUKEE



The Rex 200 single Pumpcrete which repumped concrete from the 10th to the 17th floors.

Send for the book, "Concrete by Pipe Line" which illustrates the Pumpcrete setup on many jobs like yours. Fill this coupon.

CHAIN BELT COMPANY

1666 West Bruce St., Milwaukee, Wis.

Please send me my copy of "Concrete by Pipe Line."

My job of . . . yds. will take . . . months pouring time.

Firm Name

By (Title)

Address

City State

Lincoln Parish, La., Casts Culvert Pipe

Equipment, Road Work and Plant for Construction of Own Culvert Are Described In Interview

† IN Lincoln Parish in northern Louisiana no school child in any part of the parish has to walk more than one-half mile to reach a school bus traveling on an all-year road. Eddie Evans, Parish Engineer, through the cooperation of the Police Jury, has extended the road system so that school buses carrying from thirty to fifty children can travel the roads throughout the year.

"A road that a school bus that size can travel, a farmer can use at any time," remarked Mr. Evans during an afternoon's interview which included a discussion of Parish finances (he is also Parish Treasurer and Secretary of the Police Jury), the use of local low-grade iron ore as a road metal, and making concrete culvert pipe with prison labor.

The Parish Road System

Lincoln Parish has an area of 472 square miles, 268.6 miles of surfaced roads on which local gravel or iron ore has been used, and 157.5 miles of dirt roads that are maintained regularly by the parish. In addition there are some 150 miles of dirt roads that serve only one or two farmers who look after the maintenance themselves after the parish has once graded the road. The state maintains 197.8 miles of concrete, surface-treated and gravel roads in the parish in the state and Federal road systems. Of these the state built 126.2 miles and took over the balance from the parish after it had built them.

Financing Road Work

The road budget of the parish is \$50,000 a year, which includes \$30,000 from the road maintenance tax on real estate and \$20,000 returned by the state from its gas-tax collections. This amounts to one cent of the tax and is divided among the parishes in proportion to the total taxes collected by the various parishes for road work in 1935.

Equipment Owned by the Parish

The equipment of Lincoln Parish is owned and operated by the parish as a whole instead of by divisions of the parish according to the make-up of the Police Jury. For trucks the parish has four Ford and four Chevrolet 1½-ton dump trucks, as well as a Chevrolet pick-up truck which is used by the Road Supervisor for his transportation and as a utility truck. The parish has built two semi-trailers which it has found very useful for transporting materials and equipment. One is a pole hitch for carrying timbers and the other a small platform trailer for moving the dragline and tractors.

For ditch work and other excavation the parish owns a P & H dragline with a ¾-yard P & H bucket. There are three tractors, a Sixty-Five gas, a Thirty gas, and an RD6. Two Caterpillar diesel No. 11 Auto Patrols with 14-foot moldboards are used for maintenance on the 268 miles of surfaced roads. The larger moldboards are found much more effective in covering the road than the shorter ones which require more trips per mile of road. There are two pulled graders, a Caterpillar 77 with a 12-foot blade and a Caterpillar 44 with a 10-foot blade. Dirt-moving equipment includes an Adams rotary scraper, an Atlas rotary and a Continental 4-yard hydraulic scraper. For use at the culvert plant the parish owns a 1-bag Jaeger tilting concrete mixer.

Costs on the Auto Patrols show that

the parish can operate them with the 14-foot moldboards for \$1.00 to \$1.10 for diesel fuel for a 10-hour day.

Types of Roads

Most of the roads in the parish are 12 feet wide for the traveled surface and have 6 inches of road metal with 4-foot shoulders on either side. Only a few miles of road are 24 feet wide. The roads are staked off with a 30-foot width in the center of a 60-foot right-of-way and sometimes the parish goes back of the right-of-way for the back slopes. A slope of 2 on 1 is maintained wherever possible on all fills.

The iron ore, entirely too poor in quality and too scattered to be of any use commercially, is found in layers from 4 to 18 inches thick and contains



C. & E. M. Photo
Where Parish Prisoners Cast Concrete
Culverts

a considerable amount of gravel within

the beds of ore. The parish makes a contract to take the iron ore from a farmer's land, goes in and plows the material, after stripping the top soil, and then loads it with the dragline. In some cases the loading is done with the prison labor and sometimes the material is so soft that the preliminary plowing is unnecessary.

A few deposits of the same type of iron ore but broken up in bars have been found in the beds of creeks and have been worked, but these have not been as abundant as the thin strata. After the iron ore has been removed from a farmer's land the parish grades the land off and in a couple of years after the planting of the kind of crops that put nitrogen back into the soil it is as fertile as ever.

The program of parish road construction calls for the addition of about 25 miles per year of the iron-ore surfacing. These roads cost about \$1,000 per mile, including the right-of-way and culverts.

(Concluded on page 27)

MEN MOLD MOUNTAINS

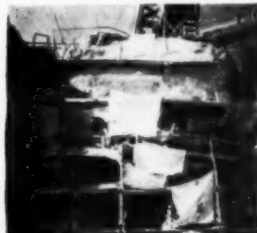
Sculptor Borglum's heroic figures look out across the Black Hills from 6000-ft. elevation



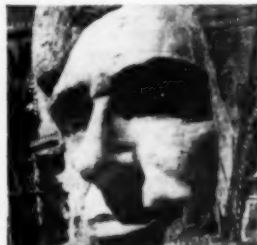
CLOSE-UP of the Mt. Rushmore Memorial Group at present. Note the enormous amount of granite that has been drilled and chipped so far. Note the workmen in various areas of the photo.



GUTTON BORGLUM'S famous Mt. Rushmore National Memorial, nearing completion in the Black Hills of So. Dakota, from a distance of 1500 feet. Washington, Jefferson, Lincoln, and Theodore Roosevelt will comprise the group.



OUT OF THIS MASS of granite, 6000 feet above sea-level, will emerge the likeness of Theodore Roosevelt. Thousands of cu. yds. of solid granite will have to be drilled and removed.



A CLOSE-UP of the partially finished likeness of Lincoln. Note ladders and cat-walks for comparative size. These figures are the largest ever to be hewn out of granite anywhere in the world.



ALL COMPRESSORS and air tools in use on this gigantic undertaking are Texaco lubricated 100%.

CHANGING the contour of mountains into heroic likenesses of men requires power from machines.

Texaco is proud of its association with this monumental undertaking, designed to commemorate the memory of these American immortals. The equipment used is Texaco lubricated 100%. The Texas Company, 135 East 42nd Street, New York City.



TEXACO

Industrial Lubricants

25th Anniversary Of Bay City Shovels

In commemoration of its twenty-fifth anniversary, Bay City Shovels, Inc., Bay City, Mich., has issued a new general catalog covering its complete line of convertible shovels, available with crawler mounting in $\frac{3}{8}$ to $1\frac{1}{4}$ -yard capacities and with truck mounting in $\frac{3}{8}$ to $\frac{3}{4}$ -yard sizes. Crane capacities range up to 20 tons. Also featured are dragline buckets and a new line of single-purpose and deck-type trailers.

A brief review of the history of the company; descriptions and illustrations

of the features of the Bay City line, including special analysis high-strength alloy steels, anti-friction bearings, pressure lubrication, E-Z touch booster-operated clutches and brakes and helical gears; condensed specifications; working ranges and job pictures are included. Copies of this Catalog H may be secured by interested contractors and engineers direct from the company.

New 1939 CMC Catalog

Presenting the progress of the company from its original concrete mixer to its present-day models, the new 1939

catalog of the Construction Machinery Co., Waterloo, Iowa, contains complete information on the line of construction equipment made by that company. Described and illustrated are the one, two and three-bag non-tilting mixers in two or four-wheel, side or end-discharge models, the new end-discharge $3\frac{1}{2}$ S tilting trailer mixer, the latest CMC self-priming pumps, hoists, plaster and mortar mixers, power saw rigs, concrete carts and wheelbarrows.

Copies of this new catalog may be secured direct from the manufacturer by mentioning this item, or from this magazine.

New Foundation Engineer For Union Metal Mfg. Co.

Announcement has just been made of the appointment of Armen H. Tashjian as Consulting Engineer in charge of foundation engineering for the Union Metal Mfg. Co., Canton, Ohio, manufacturer of steel piling for foundations. Mr. Tashjian, who was associated with Walker & Weeks, Architects, in Cleveland since 1912, and during that time had personal charge of some of the most difficult foundation work in that city, will make his headquarters at 2341 Carnegie Ave., Cleveland, Ohio.



LOWER OPERATING COST. A "Caterpillar" Diesel D7 Tractor with bulldozer cutting down and sloping bank to widen county highway in Wallawa County, Ore. Consumes only 12 gals. of $9\frac{1}{2}$ c fuel per 8-hour day—against 35 to 40 gals. of 15c fuel by tractor formerly used.

DOUBLE-DUTY VERSATILITY in this outfit consisting of a "Caterpillar" Diesel D7 Tractor and a "Caterpillar" No. 66 power-controlled Grader. When not engaged in pulling grader, tractor (using low-cost fuel—sparingly) can be put to other useful road-building and maintenance tasks. Operation—Marion County, Iowa.

*The Easier, Quicker,
Cheaper way
to More and
Better roads*

FAST BLADING on straight-away township dirt road near Humboldt, S. D., with the lighter, single-drive "Caterpillar" Diesel No. 10 Auto Patrol. Adapted for surface maintenance, scarifying, light construction, ditching, finishing, etc.

MORE POWER, GREATER SPEED RANGE, WIDER BLADE SCOPE with the sturdy new "Caterpillar" Diesel No. 12 Auto Patrol. Full-revolving, high-reach, ample-clearance blade permits forward-and-backward blading, high and low bank cutting, deep ditch cutting. Picture shows old-road reconstruction near Afton, Calif.



CATERPILLAR DIESEL POWER

ROAD MACHINERY • TRACK-TYPE TRACTORS • DIESEL ENGINES

CATERPILLAR TRACTOR CO., PEORIA, ILL.



The New Lorain 79 Diesel-Powered Excavator

New 1½-Yard Shovel

The new Lorain 79 1½-yard excavator, recently announced by the Thew Shovel Co., Lorain, Ohio, is a newly designed machine readily convertible to shovel, crane, clamshell, dragline or backdigger service. The machine is mounted on an entirely new chain-drive crawler 13 feet 8 inches long and 10 feet 6 inches wide, equipped with 24-inch treads and with treads 28 and 34 inches wide also available. It has two travel speeds, 1½ mph and ¾ mph, in either direction.

All propelling and steering mechanism is located in a central steel carbody casting or gear box and all operating mechanism is protected against mud, dirt and water by an oil-tight gear case, fitted with inspection plates and hand holes to permit easy and quick inspection of gears and clutches. All bearings in the propelling mechanism have pressure lubrication direct to each bearing, provided through grease leads centralized at the front of each casting. The entire mechanism in the gear box operates in an oil-bath. The structural steel frame consists of two H-beam cross girders and two side frames, the latter each consisting of two composite girder structures of welded design. The entire structural frame is assembled largely by electric welding. Other features of the crawler unit include steering clutches which slide on splined shafts, permitting steering in either direction; a locking and safety ratchet and pawl on the horizontal propelling shaft, permitting positive locking of both tread belts; and the elimination of rollers or idlers along the top to support the top of the crawler tread belt which instead is supported by a full-length T-rail.

The all-welded shovel boom of the Lorain 79 is 23 feet long, the two boom side members each being a built-up steel tube of rectangular cross section, welded into a unified structure. The dipper stick is also of all-steel all-welded construction and is actuated through an independent chain crowd acting through a hinge pin.

The turntable is of center-drive design, power being taken from the 6-cylinder diesel engine and transmitted through a silent chain drive. This permits all the engine power to be concentrated directly on any one operation or to be spread in proper balance over two or three simultaneous synchronized operations.

As a shovel, the Lorain 79 is equipped with a 23-foot boom, an 18-foot dipper stick and a 1½-yard dipper. A special stripping boom 25 feet long with a 25-foot stick and a 1¼-yard dipper is available. As a crane, the machine's capacity is 25 tons at a 12-foot radius, equipped with booms from 40 feet up to any desired length by means of insertable center sections. Dragline booms and equipment are also available. The backdigger has a 24-foot tubular boom with a 10-foot 6-inch dipper stick. Dippers come in 31 to 42-inch widths and are of the controlled tilting type whereby the operator has control of the digging angle and dumping position at all times.



The New Hug Chain-Drive Truck

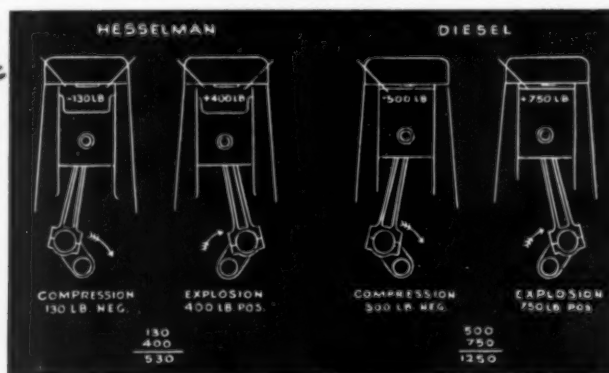
Heavy-Duty Trucks Have Chain Drive

A series of three new heavy-duty chain-drive trucks has just been announced by the Hug Co., Highland, Ill. Model 98-CD is a single-rear-axle chain-drive model with a maximum gross vehicle weight of 60,000 pounds, equipped with a standard 10 to 12-yard Boulder Dam type body. Model 98-MB, a dual chain-drive rear-axle model, has a gross vehicle weight of 72,000 pounds and a standard 16-yard Boulder Dam type body, and Model 99-MA, also a dual rear-axle chain-drive model, has a maximum gross vehicle weight of 120,000 pounds and is equipped with a 25-yard Boulder Dam type body.

The Maxi chain-drive units furnished in these models are made by Six Wheels, Inc., Los Angeles, Calif. These models are all built and designed for extra heavy-duty service and incorporate special features of Hug design, such as the all-welded I-beam frame, front axle rocker action, set-back wheel design, and heavy-duty armored cowl, hood and radiator guard. There is air-brake equipment on all wheels, and a bucket-type seat is standard, with a closed steel cab as optional equipment at extra cost.

Heavy-Duty Batteries

A new 8-page catalog on Goodrich heavy-duty truck and diesel-starting batteries has just been issued by the B. F. Goodrich Co., Akron, Ohio, and is available from that company or from this magazine. This new catalog explains the construction of this line of batteries, with illustrations, and gives complete specifications and plate dimensions on each of the batteries offered for a specific service.



Just Compare Pressures

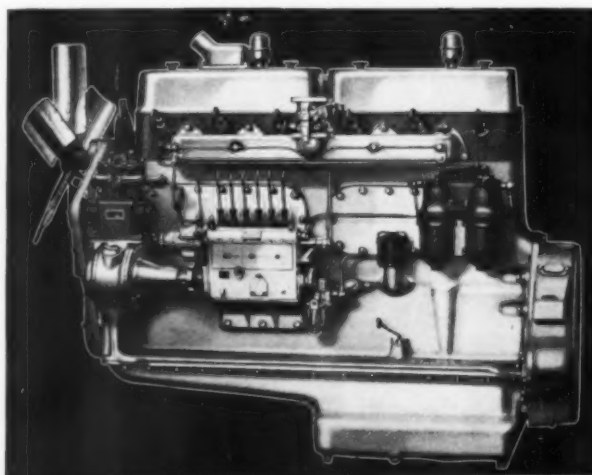
You have to save a lot of seven-cent gallons of fuel to pay for the added up-keep of a high pressure, compression ignition engine.

In a Hesselman, compression is only 120-130 lb., about one-fourth the pressure needed if it were not for the spark plug ignition. And the explosion pressure of 400 lb. is not even as high as the compression pressure in a Diesel.

In a Diesel the total instantaneous reversal stress at top dead center in the crankshaft is as high as 1250 lb.—more than twice that of Hesselman's 530 lb.

Waukesha-Hesselman Oil Engines have none of the Diesel's high pressure disadvantages. They use positively-timed electric ignition . . . they start in any weather promptly and easily . . . cost little to maintain . . . burn not only any high-speed diesel fuel but all the popular low-cost domestic burner oils . . . perform with all the snap and ginger of a good gasoline engine. *Bulletin 1011* explains all these advantages. *Get it.*

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES



WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Day Street
New York, N.Y.

Hayward Buckets

WAUKESHA-HELSELMAN OIL ENGINES
FOR THE GREATEST OVER-ALL ECONOMY

Plywood Concrete Forms

Contractors and construction engineers concerned with the erection of forms for concrete may be interested in a new bulletin recently issued by the Douglas Fir Plywood Assn., Tacoma, Wash., on the use of Douglas fir plywood for this purpose. Copies of this bulletin may be secured free upon request to the Association.

Douglas fir Plyform concrete-form panels are available in standard sizes up to 4 x 8 feet and in finished thicknesses of $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$ and $\frac{3}{4}$

inch, and larger dimensions are obtainable on special order. It is claimed that the large smooth panels cut the number of joints and fins to a minimum, reducing leakage of cement and water, and lessening the cost of finishing. Another feature is the number of times these forms can be re-used. As many as fifteen reuses were reported on the San Francisco-Oakland Bay Bridge.

New Road-Binder Bulletin

Raylig road binder, a low-cost lignin road-soil stabilizer, which made its Road

Show debut at the A. R. B. A. Highway Exhibit in San Francisco this month, is described in a new illustrated specification pamphlet which sets forth Raylig's uses and methods of application in low-cost construction and maintenance. Raylig has been used in road work for the past four years as a base stabilizer under high-type wearing courses, for dust control and surface stabilization, and for stage construction.

Copies of this pamphlet may be secured by interested state and county highway engineers direct from the Western Road Binder Co., White Bldg.,

Seattle, Wash., sales agent for Rayonier Inc., producer of Raylig, by mentioning this item.

Concrete Barrow Catalog

Bulletin No. 42A, describing American DeLuxe concrete wheelbarrows in sizes of 3, $3\frac{1}{2}$ and 4-cubic foot struck capacities, with seamless steel trays, extra bottom plate and pneumatic tires, may be secured by interested contractors and state and county highway departments direct from The American Steel Scraper Co., Sidney, Ohio.

BOOST YARDAGE 50%

**CUT SCRAPER LOADING TIME $\frac{1}{2}$ TO $\frac{1}{3}$.. ADD 2 TO 3 YARDS PER LOAD
.. REDUCE MAINTENANCE COSTS BY USING AN L-O PUSHER TRACTOR**

Increase your scraper yardage as much as 50%, yet cut your equipment investment. Here's how: Put an L-O Pusher tractor in the cut to give your tractor-scraper rigs a boost while loading. Thus you double the power on the cutting blade ... increase the payload from 8-9 yards to 10 and 11 yards ... yet cut loading time from a third to a half! The L-O Pusher swings about so quickly, maneuvers so easily, and travels so much faster than ordinary tractors that, even on short hauls, it easily takes care

of three to four scraper outfits. You have less maintenance expense per yard, too, because the L-O Pusher relieves the hauling tractors of the severe jerking and twisting strains of loading, thus reduces repair bills and time losses. By using L-O tractors to pull the scrapers you move those big loads at speeds up to 6.41 m.p.h. or 564 feet per minute—nearly 100 feet faster than ever before possible with a big tractor. Ask your Allis-Chalmers dealer to prove it ... on your job.



A Profit-Making Boost—This L-O Pusher, operating against a bumper block at the rear of the Gar Wood scraper, cuts loading time and loading distance practically in half. Here, with a fleet of 4 L-O's and 4 Gar Woods, it increased yardage per hour from 332 to 500 yards on an 800-ft. round trip haul.

ALLIS-CHALMERS POWER

TRACTOR DIVISION — MILWAUKEE, U.S.A. TRACTORS, ENGINES, ROAD MACHINERY



DOWN
GO
MAINTENANCE
COSTS
with

LINCOLN-ITE
PULVERIZED PETROLEUM ASPHALT
Trade-Mark Registered in the United States and Canada

THE OHIO OIL COMPANY
INCORPORATED

ASPHALT
DIVISION
•
ROBINSON
ILLINOIS

Maintenance Garages For Highway Units

**Space, Proper Lighting
And Adequate Equipment
Are Important Features
Of Ideal Garage**

By W. H. ROOT, Maintenance Engineer,
Iowa State Highway Commission

(Photos on page 48)

♦ WHY do states have district maintenance garages? Why, in fact, do they have any garages? Every state has a fleet of automobiles used by the various departments in building and maintaining state roads. The housing of such transportation equipment requires some buildings, and their repair and servicing require a few mechanics and servicemen. But this is not the type of garage I have in mind. What I am thinking about is the large well-equipped garage in which heavy trucks and tractors are overhauled and in which all kinds of heavy maintenance equipment is stored. The need for such type of garage is dependent upon the answer to the old argument of day labor versus contract work. I am a firm believer in contract system. Any job for which an intelligent plan can be prepared and which can be fairly accurately estimated is a contractible job. If such, it should be advertised for bids and a contract awarded to the lowest responsible and qualified bidder.

Much maintenance work is not contractible, either because adequate plans therefor cannot be prepared or because, due to uncertainties, the work cannot be intelligently estimated. Such jobs must be done by day labor. This type of work includes many surface-smoothing operations on low and medium-type roads as well as all snow and ice removal work from all types of roads. The accomplishment of these jobs by day labor requires a good deal of equipment, ranging from light trucks and blades to the heaviest trucks, tractors and snow plows. It is the repair and housing of this equipment which make the many maintenance garages necessary.

The Ideal District Garage

In building a district maintenance garage there are three important factors which should be kept in mind. They are roominess, proper lighting and adequate equipment. In choosing the site, it is a good policy to acquire about twice as much land as is required for the equipment in use at that time. After our district garages have been in use from 5 to 10 years, in no case do we have a surplus of land and in a good many instances we are cramped and crowded and the acquisition of additional land then would be difficult and expensive.

The garage building itself should be made larger than necessary to house equipment owned at the time the garage is built. In order to avoid waste space, we prefer a rather long narrow building with entrances along the long side of the building to each stall. With this arrangement the building must be built wide enough so that the largest truck and snow plow can be driven in and the doors properly closed behind it. We find that for our equipment a width of 34 feet is minimum.

All the walls in the garage should be virtually filled with windows, and a double row of windows should be placed in the doors. This will insure adequate daylight, which is always better than artificial light. However, there will be dark days when artificial light will be necessary, which means that the garage must be completely wired and modern lighting fixtures installed.

Good Tools Make Better Jobs

Possibly the most important factor in a maintenance garage is the matter of equipment and tools. Even a poor mechanic with proper equipment and tools can usually turn out a fair job and a good mechanic is made even better if he has adequate shop equipment. The principal items of equipment which we have in our district garages and which we believe are essential, are the following:

Overhead oil storage
1 40 to 50-ton two-speed hydraulic press
1 18-inch bench foot grinder
1 floor stand grinder
1 transmission oil pump for pumping transmission oil direct from barrels.
4 pressure-grease guns, one large gun for chassis work and three smaller ones for different grades of grease.
1 small air compressor for operating grease guns, motor cleaners, paint guns and for inflation of tires.



A Neat Appearing District Office and Garage in Iowa

1 15 or 16-inch screw-cutting back-gear lathe with 5-foot bed.
1 24-inch back-gear upright drill press
1 1/2-inch heavy-duty electric drill
1 3/4-inch heavy-duty electric drill
1 battery charger
1 complete set of tools including special tools for equipment in the district.
1 3 to 5-ton hydraulic floor jack
1 overhead trolley with 2 or 3-ton hoist
1 550-gallon underground gasoline tank with metering gasoline pump
1 electric welder
1 acetylene welder

1 complete blacksmith outfit
1 paint spray gun
1 power hack saw

Highway Garages in Iowa

In Iowa we have a garage in each county where equipment may be stored and where minor repairs can be made. At each district headquarters, of which

(Concluded on page 43)

KOEHRING



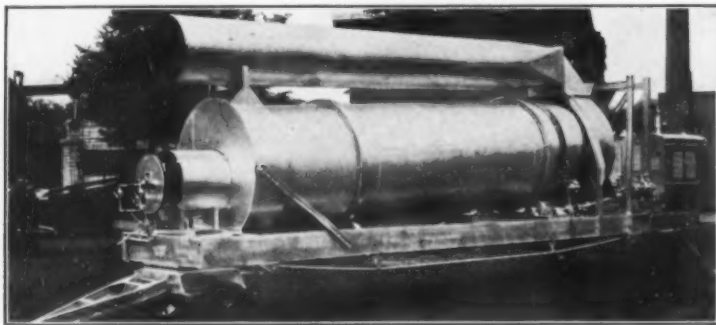
Wheeler method
Moves Dirt • Faster • Cheaper

Loads of power to load — exceptionally high speed for travelling — Push tractor applies power where needed, *behind* the cutting blade. High speed, time-tested job-proven Koehring Tractor hauls the Wheeler to and from the dump. Write for information about costs and production of *This Newest Method* — *The Koehring Wheeler Method*

KOEHRING COMPANY
MILWAUKEE • WISCONSIN



HEAVY-DUTY CONSTRUCTION EQUIPMENT



The White Model K-5 Portable Material Dryer

New Material Dryer

With an increasing number of state highway departments requiring the use of dried aggregate in certain types of paving material, a need has arisen for completely portable large-capacity dryers. A complete line of fully portable dryers in capacities of 4, 8, 12, 25, 40 and 50 tons an hour is now being made by the White Mfg. Co., Elkhart, Ind. These machines, all of which are mounted on solid or pneumatic tires, are of the conventional rotating-drum type, equipped with oil burners. Inside of the drum are the conventional shelves around its periphery, and in addition a centrally suspended cross flight increases the area of hot steel with which the material is in contact. The use of a stack the same length as the dryer and approximately half its diameter eliminates the necessity for a blower.

The Model K-40, shown in the illustration, has a 60-inch x 20-foot drum, with a capacity of 40 tons an hour. It is operated by a gasoline-engine power plant and is equipped with an air compressor for the burners and a 20-foot cold bucket loader. The machine is 33 feet long, 7½ feet wide, 11 feet 6 inches high and weighs 25,900 pounds. The chassis is equipped with semi-elliptic springs, free rotating turntable, towing tongue with cast steel eye, and rubber tires.

New International Movies

Two new sound films, one entitled "Snow Fighters" and the other "Earth Moving," have just been released by the International Harvester Co., 180 No. Michigan Ave., Chicago, Ill., and may be borrowed free of charge. "Snow Fighters" shows an organized plan for

snow-moving operations in which state, county, township and municipal officials cooperate in efficient use of equipment in order to keep traffic moving. Motor trucks, wheel tractors, maintainers and crawler tractors, all equipped for snow moving, are shown working on the particular type of highway for which each is adapted.

The second film portrays the different types of equipment used in a variety of typical earth-moving operations, including highway construction and maintenance, clearing and grubbing, sand and gravel pits, etc.

Interested groups, having suitable sound projection equipment, which would like to borrow these films should communicate with the International Harvester Co., mentioning this magazine.

Gravel Plant Also Produces Rock Chips

With the increased mileage of black-top roads, there is also an increased demand for rock chips for the seal coat. In the Pioneer vibrator duplex crushing plant there is a new screening arrangement whereby rock chips are produced as a by-product at the same time road gravel for the base course is being produced. Crusher dust is screened out of the chips. In these plants, the bottom deck is used for the pit-run material only and the top deck screens only the

crushed material. Therefore it is possible to screen out 100 per cent crusher chips on the top deck, where spouts are provided to deliver the chips to a belt conveyor.

Complete information on this Pioneer vibrator duplex crushing plant may be secured direct from the Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn., by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

COMPLETE WELL POINT SYSTEMS

WILL DRY UP ANY EXCAVATION

Faster—More Economically

Write for Job Estimate and Literature

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MACHINERY & EQUIPMENT CO., Inc.

36-40 11th St., Long Island City, N.Y.

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SHOWS ITS CLASS



ON THAT LAST HALF YARD

● It's the heaped load . . . that last half yard . . . which makes A-W Tractor Scrapers stand out as exceptional time-savers and money-makers.

These A-W Tractor Scrapers outperform because bit, pan and bowl have been engineered to insure that even flow of material which assures a full load each trip and the chance for profitable yardage every working day.

Austin-Western Tractor Scrapers are available in three sizes—5, 6 and 8 yards. One lever and one cable, control all loading and dumping . . . raising and lowering the bit with trigger-quick action. Wide spread rear wheels track inside the cut, always traveling over even ground, to steady the cutting edge and save power. The pan bottom always remains level while loading. Clearance between the ground and pan is ample for rough going.

These three sizes, with the high-output 12-yard hydraulic control scraper, give you a complete line to choose from, a perfect machine for the tractor you now own or plan to buy!

Write now for full details on the A-W Scraper best suited to your tractor equipment.

The AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.

Motor Graders
Roll-A-Planes
Rollers
Snow Plows

Crushing and
Screening Plants
Washing Plants
Blade Graders

Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders

5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

LATEST IN HOISTS



30 to 50 H. P. JAEGER HOISTS NOW OFFER

- Touch Control thru Giant Expanding Frictions or Clutches.
- Timken Self-Aligning Bearings.
- Combined Side Frames and Base, All-Steel, Lighter, Stronger.
- Self-Starters, up to 8 Cyl. Power, many Jaeger improvements—all at ASTONISHINGLY LOW PRICES!

OTHER SIZES 10 TO 100 H.P.—Most modern hoists on market—single, double, three drums, gas or electric. Send for Catalog.

THE JAEGER MACHINE CO.
701 Dublin Ave. Columbus, Ohio

JAEGER



The New Lincoln Grease-Gun Outfit for Lubricating Heavy-Duty Equipment

New Lubricating Gun For Road Equipment

Among the equipment at the Highway Exhibit of the American Road Builders' Association in San Francisco was the new grease gun, for lubricating road and other construction equipment, recently announced by the Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis, Mo. The unit consists of a gun, grease container and gasoline motor, all mounted on a rugged caster truck to provide ease of movement from one point of service to the other. Power for the gun is furnished by a Briggs & Stratton gasoline engine, and the capacity of the grease container is 30 pounds.

Other units are described in Bulletin 603 covering the Lincoln line of heavy-duty equipment for the complete lubrication of trucks, tractors, road machinery, shovels, and heavy-duty construction equipment. Hand-operated grease guns and grease fittings of all types are described in Catalog No. 70. Copies of either or both of these publications may be secured by interested contractors and state and county engineers direct from the manufacturer by mentioning this item.

Truck on West Coast Driven 400,000 Miles

A truck with the equivalent of more than sixteen trips around the earth or almost a complete round trip to the moon to its credit is operating efficiently in Los Angeles. Owned by the S. H. Bacon Materials Co. of that city, this Ford V-8 was purchased on January 1, 1935 and was equipped with a heavy-duty two-speed driving axle, trailing axle and heavy-duty dump body. In its four years of service it has traveled well over 400,000 miles, hauling approximately 100,000 tons of sand, gravel, cement and other building materials.

S. H. Bacon, owner, reported: "This truck has averaged over 300 miles a day. This means that it has been in constant use 12 hours a day, 360 days a year, since we placed it in service. We have changed the engine six times, in accordance with our operating policy, giving an average of 65,000 miles per engine. We operate our own garage with a competent mechanic in charge and we always have a spare engine in good condition ready to install when it is needed. This method enables us to keep our trucks in good operating condition."

SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.

Two New Features Of 1939 Black-Topper

The Etnyre 1939 Black-Topper bituminous distributor is characterized by two new features, according to a recent announcement by E. D. Etnyre & Co., Oregon, Ill. One of the new features of the Model FX is a turn-up folding-type spray bar which is made to swing when the end hits an obstruction on the side of the road, thus eliminating the danger of damaging the bar or other mechanism, and which is quickly and easily interchangeable with the full-length circulating bar. Both bars are adjustable for height and to the contour of the road, can be raised and folded for traveling, are of the non-drip type and are cleaned after spraying by the Vacu-Flo system to prevent waste of material. The other new feature is a double cut-off between the tank and pump. This is a dual-valve arrangement, one valve located inside the tank with remote control by hand wheel on top of the tank. The service valve is operated by a lever.

The manufacturer states that in this new model every provision is made for the safety of the operator as well as for the traveling public. Superfluous weight and complicated mechanisms have been eliminated. This Etnyre Model FX Black-Topper not only heats and applies material rapidly, accurately and uni-

formly but fills its own tank with its own power. Material can be transferred at full pump capacity from one tank to another, and can be circulated in its own tank or in the storage tank for heating. The distributor can be operated either from the front end by the truck driver or by the rear end man from either side.

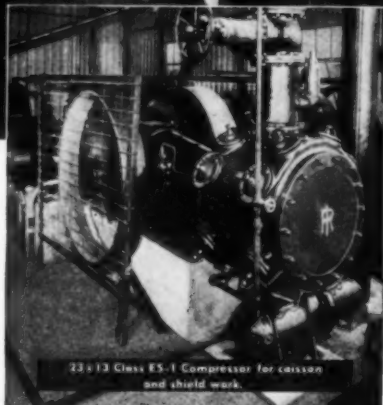
BIGGER PROFITS! BETTER CONCRETE! with MALL CONCRETE VIBRATORS

With MALL vibrators on the job, you eliminate expensive hand spading, get greater strength, density and uniformity. You also effect greater economies through the use of coarser aggregate and less cement. The same MALL power unit can be used for SURFACING, SAWING, SANDING, DRILLING, and PUMPING to help you get the biggest dividends from your equipment investment.

MALL TOOL COMPANY
7745 South Chicago Avenue Chicago, Illinois
OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES



MALL gas engine vibrator. Delivers 7000 vibration frequencies per minute.



23 x 13 Class ES-1 Compressor for caisson and shield work.



Model 315 Ingersoll-Rand Portable Compressor.

Herlihy Mid-Continent Company have started work on Contract S-5 for the State Street subway in Chicago. This project demands dependable compressors for the air supply to the "sand-hogs", and for the operation of air tools.

The illustration shows the first compressor equipment being delivered to the job. A battery of Ingersoll-Rand stationary and portable compressors, similar to those shown, will supply low and high pressure air for this project. I-R air tools will do the digging.

Ingersoll-Rand equipment for the contractor includes stationary and portable compressors, rock drills, Jackbits, clay diggers, paving breakers, air hoists, sump pumps, etc.

730-1

Ingersoll-Rand
11 BROADWAY, NEW YORK, N. Y.

Diesel Engine Base Repaired by Welding

(Continued from page 1)

swinging 16-cubic yard buckets on 175-foot booms, ran night and day, stopping only to oil, and shutting down only when something broke.

Both contractors have depended strongly upon welding as a means of repairing even the heaviest of breaks and of keeping the machines in operation. Tubs, walking shaft cams and spiders, buckets, etc., have been welded, rebuilt and kept in reserve. Sometimes they have been welded without removing them from their place on the draglines. A walking gear repaired in this way on the Boyce-Igo 10-W has now been back in service over two years and similar heavy welds on Callahan draglines have a service record up to seven years or more. The welder who made them is still on the job.

Repair of Engine Sub-Base

Recently the cast iron sub-base of the 450-hp Fairbanks-Morse diesel engine on one of the 10-W's owned by Callahan-Gunther & Shirley developed a 27-inch crack on one side, a few inches from the top. Investigation showed that it was caused by the bottom end of five 2½-inch vertical braces which had broken loose inside the casting. Replacement would cost several thousand dollars. Obviously the breaks inside could not be reached with standard welding equipment but a careful study, including a "pre-view" of the repair, showed that special electrode holders could be used. Machined nickel steel replacement studs, screwed into a thimble section welded at the bottom, were used, the entire job costing about \$2,000.

Preparation for Work

The cylinder base, with 2¼-inch studs penetrating 3½ inches in the top of the sub-base, was removed. Holes were drilled and tapped through both the top and bottom of the casting, first using a 1-inch drill to make a pilot hole which went through the center of the cracked braces. To insure a true hole the power drill was mounted in a special frame and the bit passed through a snug-fitting hollow sleeve 9 inches long, threaded on the outside and screwed into the cylinder stud hole. A 2-inch drill bit was next used to enlarge the holes, with the hollow sleeve removed and using the original 3½ inches of hole (2 inches in diameter inside the threads) in its place. As the 2-inch bit reached the top end of the broken braces they were broken off and the drill extended through the bottom plate of the casting.

A special tap was made from a 6-inch section of tool steel, with extra taper to fit the 2-inch hole and slightly oversized threads to clean its way through the 3½ inches of original hole at the top. It was attached by Morris taper and weld to the end of a 30-inch guide bar of threaded shafting, and was turned through the hole by hand lever. The two drills described also had extensions of cold rolled steel, attached by Morris taper joints and, in the case of the 1-inch drill,

also tack-welded with bronze.

The bottom end of the rectangular special drill frame consisted of a 3 x 3 x 7¼-inch steel block, welded to a 1 x 6 x 12-inch plate, with a 2-inch hole through the middle of each for the hollow guide sleeves and later the 2-inch drill. Guide rods at the sides were 1-inch round bars 39½ inches long, spaced 10½ inches apart by the bottom plate, and a 1 x 3 x 12-inch bar at the top, and held by nuts, at each end. A hole was tapped and a nut welded on at the middle of the top bar for the feed screw to the drill. A 1 x 3-inch guide bar, with grooved ends to fit the guide rods, was used just above the base of the frame, and another similar bar between the bit and the motor. The guide rods were stiffened by tack welding 1½ x 1½-inch tees to the outside. Heavy clamp bars were placed across the frame base and attached to neighboring stud bolts, after the frame was mechanically squared with the holes.

Before the holes were tapped out the broken edges at top and bottom were

chipped off with an Ingersoll-Rand 30 chipping gun and ground off. A 30-inch extension was used on the grinder shaft, and it was passed down through the hole and the grinder installed on it from the bottom, using a right and a left threading at the end. The surface of the bottom plate was smoothed with the grinder, where the stud thimble was to be attached.

The thimbles are 7¾ inches long and

4½ inches in diameter, with the bottom end turned down and threaded to enter the 2¼-inch hole through the casting. They were installed through the openings at the side of the sub-base. The bottom inch of 4½-inch diameter is also threaded and was screwed into a 1 x 8-inch nut, attached with 7/8-inch cap screws to the casting. A 2 x 6 7/16-inch spanner nut was next started on 2½

(Concluded on next page)

"UNEQUALED SURFACE"

With the 20" single screed on the "FLEX-PLANE" gas electric or straight gas finishing machine, a smoother riding surface is produced. The yield of concrete is greater as no concrete passes under the wide screed, which is a saving to the contractor. Bulletin U-70 will be furnished upon request.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO



**NOW, we have the
profit angle!**

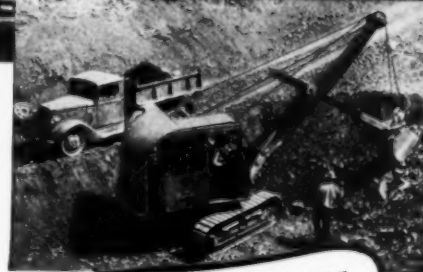


"Give me a shovel that's fast on the job—fast to get there—fast to finish! Then, bring on the competitive bids!"

P&H really started something with these new Pacemakers, built entirely of rolled alloy steels. This design cuts off dead weight, makes a machine that is stronger, lighter — and enough faster to make a big difference in yardage costs.

P&H owners can give you some interesting facts about cost cutting on all sorts of jobs. Harnischfeger Corporation, 4419 W. National Avenue, Milwaukee, Wisconsin.

P&H PACEMAKERS — Save money on the job



17 DIFFERENT MODELS
From ½ to 5 cu. yds. capacity. Gas, Diesel or electric power. Write for literature on the size and type that interests you.

P&H

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Do you wish a really superior dumping unit for handling 2-cu. yd. Detachable Buckets?

SEE OUR MODEL LF
(Load Forward)

DEMPSTER DUMPSTER

For any 1½-ton truck
NO COUNTERWEIGHT
OVERHANG
SIDESWAY

All the load on the chassis
DEMPSTER BROS. INC., Knoxville, Tenn.

Repair Work on Job Saved Time and Money

(Continued from preceding page)

inches of taper threads on the hollow top end of the thimble and the 23 $\frac{1}{8}$ -inch straight threaded stud was screwed down through the top of the casting to a jam fit 3 $\frac{1}{2}$ inches in the thimble. The spanner nut was then screwed down to tighten the assembly. Four radial $\frac{1}{8}$ -inch slots, 3 inches deep at the outside and 3 $\frac{1}{2}$ inches at the inside, permit the hollow section of thimble to close about the stud and thus prevent loosening by vibration. Extra thickness of metal was allowed to make up for stress occasioned by the closing. The studs can be removed by loosening the spanner nut.

In order to make the threads match along the 27 $\frac{3}{8}$ -inch combined length of the studs and thimbles when assembled, the studs were first placed between centers in a Walcott lathe and all threads cut. Threads are oversize where the stud is screwed in the sub-base. The blanks for the thimbles were first drilled and threaded internally for the jam fit with the studs, then centered and the stub ends turned down. Studs and thimbles were then assembled and the opposite centers used to suspend them in the lathe while the stub ends and the 1 inch on the main thimble were threaded, with the threading tool set by the threads on the stud. The assembly was then turned around and the taper threads cut and the radial slots made in the hollow end.

Welding

Doors and windows to the dragline were closed and the temperature of the casting raised to approximately 100 degrees F. with four Coleman heaters, moved about every 45 minutes. Four thermometers were spaced about evenly on the casting and half-hour readings recorded on a chart by the men assigned to pre-heating, for the information of the welder who with his helper worked 8 hour shifts. Eight hours heating was required before welding was started. Thereafter the temperature was raised at night to 103 degrees F.

The two special electrode holders used were made from $\frac{1}{8}$ -inch pipe, carefully taped for insulation, and with the whip cable attached to one end. The electrode was wedged into the other end with a pointed bit of rod and the resulting bare place insulated with a 4-inch section of acetylene hose. One holder was 20 inches long, the other 4 inches. In places, not more than 1 $\frac{1}{2}$ inches of electrode could be used at a time. In welding one place the electrode was inserted through a 1-inch hole in the casting and the welder watched his work through a similar hole around a corner.

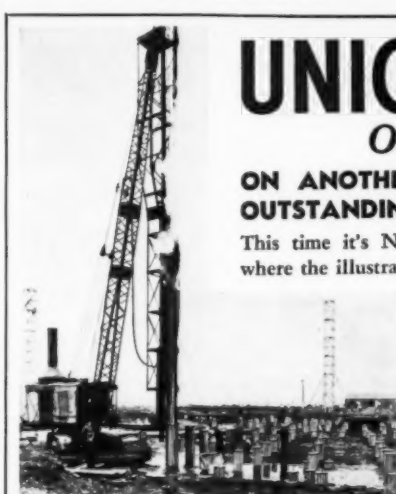
Surfaces of the cast iron were swabbed with a chemical to fill any minute pin holes which are apt to occur in cast iron and then wiped off. Holding the longest electrode holder in gloved hands and working through small openings at the top of the sub-base, the welder made part of the interior welds. The nut and cap screws were welded to the bottom of the thimble with $\frac{1}{8}$ -inch Fleetweld rod, this being an all steel joint. All other welding was done with Ferroweld $\frac{1}{8}$ -inch electrodes. The nut at the thimble bottoms was welded to the casting, and the stub end of the thimble also welded fast from underneath, where it projected through. This was overhead work and required extra care in placing the metal. Welds were brushed and peened lightly after every three or four rods, using a special $\frac{3}{4}$ -inch peening tool 24 inches long in the air gun. Skipping about kept any one spot from overheating. On the interior work the helper held the ground contact clear unless signaled by the welder to make contact.

The 27-inch crack in the casting wall,

which was about 1 $\frac{1}{2}$ inches thick, was veed out with the chipping gun, at about 90 degrees, within $\frac{1}{8}$ inch of the inside. The edges were drilled and tapped for 116 $\frac{1}{4}$ -inch round iron studs, screwed in to form "roots" for the weld. This break was swabbed and the weld brought up like the others. Seven mild steel ribs, 1 inch thick and shaped to suit the contour of the casting, were shaped with an Oxyweld cutting torch, ground, and welded across the break. Current was supplied by a Lincoln 200-ampere portable welder.

The temperature was raised over a period of four hours and held at 106 degrees F. for six hours, moving the stoves as before. The stoves were then removed and the casting cooled over a period of 16 hours, checking the temperature every 30 minutes.

Watch these pages for announcements of the 1939 models of construction equipment. For further information write direct to the manufacturer or to this magazine.



UNION PILE HAMMER

Of Course!

ON ANOTHER OF THE COUNTRY'S OUTSTANDING AIRPORT PROJECTS

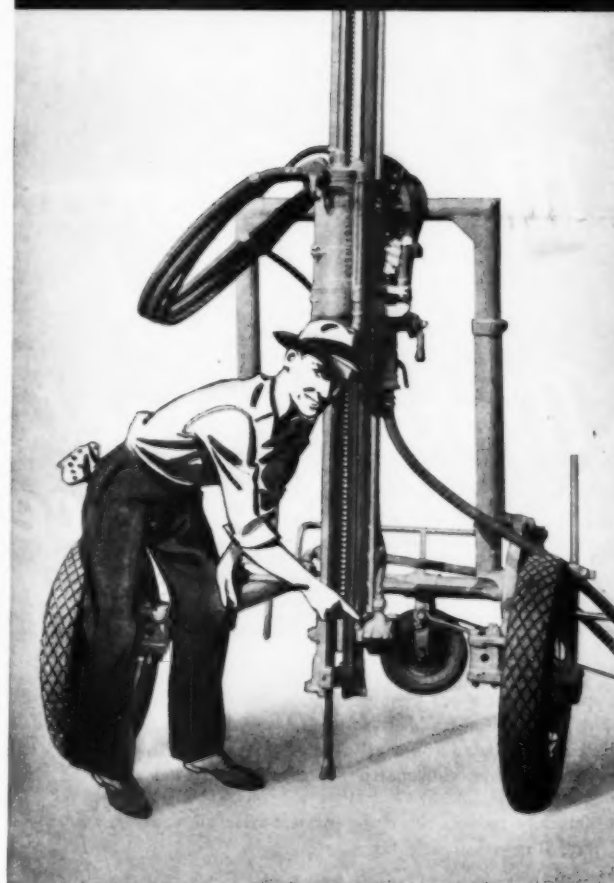
This time it's North Beach Airport, New York, where the illustration shows one of two Size No. 1

UNION PILE HAMMERS driving fluted steel pile shells for foundations. Interchangeable bases will convert this same hammer for driving concrete piles, steel sheeting, round wood piles or pipe.

Write for full story today

UNION IRON WORKS INC. P. O. Box 18,
ELIZABETH, N. J.

EVERY BLOW COUNTS WITH THE CLEVELAND DR8



● Cleveland Drill Rigs have always been leaders. Cleveland pioneered experimentation with continuous airfeed, through which long steel changes are made without shifting a guide shell. We first introduced the swivelling wheels, a construction which facilitates moving the machine from hole to hole. Pneumatic tires, the tubular frame, used as an air receiver, and the steady-forward leg point—all these were first used by Cleveland.

And now we have the Recoil Device, a simple mechanism that makes every blow of the hammer count—increases drilling, and keeps the Cleveland 'way out in front.

Let us tell you more about the savings you obtain when operating the Cleveland DR8—the wagon drill that beats them all in footage. Demonstration arranged to suit your convenience.

Bulletins on request.

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line of Hand Sinkers,
Drifters, Stoppers, Wag-
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THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT



The New Koehring Wheeler

New Koehring Models For Dirt-Moving Jobs

The Koehring Wheeler, designed to provide high speeds for traveling as well as power for faster loading, is the latest model of dirt-moving equipment made by the Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis. This unit, with which a push crawler tractor is used to facilitate loading, is mounted on a Koehring rubber-tired tractor, with speeds of 16½ to 20 miles an hour when traveling to and from the dump. Its width and height are within highway limitations, permitting travel on any highway or city street. The unit has 21 inches of clearance in hauling position, yet is flat on the ground for easy loading.

Two new sizes of pull shovels, Models 251 and 303, have also been announced by Koehring. The features of these new units are reduction in weight, due to the use of lighter but stronger steels; longer reach with increased speed for the hoist line; better vision for the operator, as a result of the improved jib-frame design; an easy-dumping dipper; fast swing speed; and enclosed gears and anti-friction bearings.

The new Koehring 702 stripping shovel is furnished with an extra long boom of 33 feet and a dipper stick of 27 feet. With this, extra long deep cuts can be made and waste material deposited on high banks.

Diesels Converted To Natural Gas Units

A natural-gas attachment, quickly applicable to all 6-cylinder 125-hp Caterpillar diesel engines for use in localities where natural gas is plentiful and cheap, has been announced by the Caterpillar Tractor Co., Peoria, Ill. To make this conversion, the pistons do not have to be touched nor do any changes have to be made in interior parts of the engine.

The diesel cylinder head is removed and with it the injection valves and lines. These are replaced by a special head, lowering the compression and providing spark plugs. The diesel-fuel injection pumps are also replaced by a magneto, and a carburetor is added to the intake air line. The entire process takes about 4 hours, according to the manufacturer, and may be conveniently done in the field. The change back again to diesel fuel is equally simple.

The full-sized full-weight D13000

diesel engine is also being offered already converted for burning natural gas, if desired, and a similar conversion will soon be available for the D17000 160-hp V-8 engine.

Automatic Road Maintainer

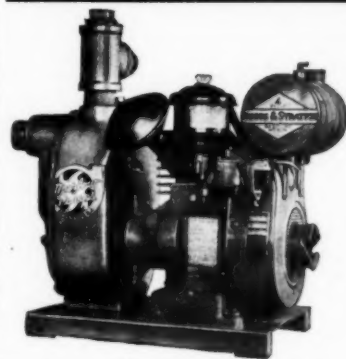
The improved Allen automatic road maintainer for the maintenance of dirt or gravel roads, for laying and finishing black top, and for shoulder work, is described and illustrated in a 4-page bulletin issued by the Allen Road Machinery Corp., 6 Gilmer Ave., Montgomery, Ala. This machine, heavier than the standard Allen maintainer, is designed for heavy-duty service by contractors and state and county highway departments.

Complete details on this new unit, as well as specifications of the standard unit, are contained in this bulletin, copies of which may be secured direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

Hard-Facing Folder Revised

A revision of the folder "Hard-Facing with Haynes Stellite Rod (Oxy-Acetylene Process)" has just been completed by Haynes Stellite Co., a unit of Union Carbide & Carbon Corp. This revised folder presents the complete procedure for hard-facing steel wearing surfaces by the oxy-acetylene process. In addition, the publication contains all necessary data on the different grades of Haynes Stellite hard-facing rod, including tensile strengths, hardnesses, and rod sizes. The inner pages of the folder list a large number of applications of Haynes Stellite rod by the oxy-acetylene process, and indicate what alloy should be used for protecting each part.

A similar revised folder presents comparable data for hard-facing by the metallic arc process. Copies of either or both of these publications may be secured by those interested direct from Haynes Stellite Co., Kokomo, Ind., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



New 1½" Pump

3,000 g.p.h., 25' self-priming suction lift guaranteed. Total head up to 55'. In aluminum or cast iron. We also make self-priming centrifugal pumps up to 10" size.

Write for Bulletin No. 11

Manufactured by

MARLOW PUMPS
Ridgewood New Jersey



GILMORE

WIRE ROPE

More Economy
in Cost
More Perfection
in Service



Other J & L Steel products:

- Jaltruss Bridge Floor Reinforcement Sections
- Bar mill products, including Bars for Concrete Reinforcement
- Bar size shapes — Hot Rolled Plates and Structural Shapes — Junior Beams — Lightweight Channels — Standard Pipe in seamless and welded — Wire Nails and Spikes — Tie Wire — Galvanized Steel Roofing and Siding.

One special point about Gilmore Precisionbilt Wire Rope all users appreciate is the added service it invariably gives when subjected to hard, . . . oppressively hard . . . service usually occasioned in mines and quarries, excavating and road work.

This naturally reduces the cost—because after all you don't buy Wire Rope—you only buy service.

The price of Wire Rope of all makes is practically the same—but do you always get what you pay for? That's why we wish to prevail upon you to try Gilmore Precisionbilt Wire Rope the next time. Try it in comparison with what you now use. Buy it with the expectation of getting longer and much more satisfactory service—you'll find it has paid you well to use ropes built with precision in a modern plant. There's quite a difference—you'll notice it. Try one on your next replacement.

CUMMER Asphalt Plants

All styles and sizes
for
HOT or COLD Mix

Heavy-Duty Mixers

45 Years' Experience

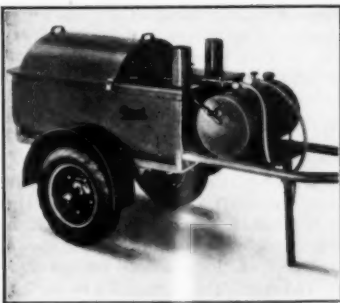
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& SON CO.

17th and Euclid Ave.
Cleveland, Ohio

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literature

GILMORE WIRE ROPE DIVISION
MUNCY, PENNSYLVANIA
JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA

**J&L
STEEL**



In the New Aeroil Heat-Master Kettle, the Heat Is Placed in the Material, Rather Than Under It

Immersion Tubes Feature of Kettle

The new Aeroil Heat-Master kettle, recently announced by the Aeroil Burner Co., Inc., West New York, N. J., provides heat for asphalt, tar or pitch with the aid of scientifically developed immersion tubes. In this new kettle, the heat is placed in the material rather than under it, resulting in a 50 per cent saving in fuel and at the same time heating the material twice as fast, according to the manufacturer. It is claimed that hot-stuff can be produced in 10 minutes from a cold start.

The Heat-Master is available in four models, either on skids or on a pneumatic-tired trailer. The oil-burning unit is sealed in the kettle itself and the burner operates in a wind-proof draft-proof well. The pneumatic-tired trailer model, which is particularly adaptable for use by contractors and state and county highway departments because of its rugged construction and the fact that it can be trailed at high speeds anywhere a car can go, is equipped with standard auto wheels and bearings, four-ply tires and strong wheel axles, chrome-nickel leaf springs, steel shackle bolts and Alemite fittings. The tow frame is made of 4-inch channel steel, reinforced with 3-inch welded steel braces. Two extra-heavy adjustable extension drop legs, one in front and one in the rear, allow for the trailer unit to be detached from the tow car and still provide a steady non-tippable kettle.

New Steel Fastening Approved in New York

A new fastening for structural steel connections, the Dardelet Rivet-Bolt, which eliminates the noise of a rivet gun, was recently approved by the Board of Standards and Appeals of New York City. To maintain quiet in the vicinity of hospitals, 18,000 of these Dardelet Rivet-Bolts were used recently in assembling 1,300 tons of structural steel for a nine-story addition to the Fifth Avenue Hospital in New York City.

The Dardelet Rivet-Bolt, made by licensors of the Dardelet Threadlock Corp., 55 Liberty St., New York City, is made of carbon manganese steel, specially formed with a button head similar to a rivet but with a ribbed grip portion slightly greater in diameter than the punched and drilled holes in the structural steel connections in which it is used. The grip lengths vary with the thickness of the steel members. The Rivet-Bolt is driven into the hole with a 7 or 8-pound maul so as to produce a bound fit in the hole. The thread end of the bolt is formed with the Dardelet self-locking screw thread on which the nut is turned and tightened. The locking qualities of the Dardelet thread have been amply demonstrated, showing that it remains locked under the most severe conditions such as are encountered in pneumatic rock-drilling equipment.

Tests held recently at the Testing Laboratories, Department of Civil Engineering, Columbia University, showed high shear values for the Dardelet Rivet-Bolt. The tests were made on the new South-

wark-Emery 600,000-pound hydraulic testing machine in the presence of engineers representing building officials, steel mills and other users. In these tests the Dardelet Rivet-Bolt developed over four times the allowed value of the structural rivet of equal size.

Gravel Plant Equipment Described in New Catalog

Bulletin No. 266-L, just issued by the Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis., describes and illustrates the latest models in the Tel-smith line of quarry and gravel-pit equipment. This includes Tel-smith primary breakers, reduction and gyrasphere crushers, jaw and double roll crushers, grizzlies, sand and gravel washers, screens, sand classifiers, feeders, belt conveyors, and portable and semi-portable crushing plants.

Copies of this new bulletin may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

STERLING No. 3 CONCRETE CARTS



STERLING No. 3 CART

This cart can be furnished with pneumatic tires

30" or 36" dia. wheels, 6 cu. ft. capacity, 14 gauge tray, underslung heat-treated axle, plain or roller bearings.

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.



**NEW LUBRICATION FITTING
INSURES
FREE FLOW
of Lubricant!**

- ★ FULL VOLUME!
- ★ CAN'T CLOG!
- ★ CAN'T LEAK!
- ★ CASE-HARDENED!

Belongs on Every Heavy Duty Bearing Makes Lubrication Easier, More Efficient

HERE'S a new type FREE-FLOW High Pressure lubrication fitting that overcomes difficulties frequently encountered in fittings now in wide use on bearings requiring a volume of lubricant delivered under pressure.

Operators like the new Alemite Giant Button Head Fitting because it makes *thorough* lubrication easy. The fitting opens readily to admit a Free Flow of lubricant to the bearings. Little effort is required and systematic lubrication is encouraged.

When pressure is released, the valve in the fitting immediately *SNAPS* back to the closed position, preventing the escape of grease which has been forced into the bearings, sealing them against abrasives and moisture, assuring longer life for your expensive machinery—safety from bearing destruction, due to inadequate lubrication. Write for information!

ALEMITE—A Division of Stewart-Warner Corporation
1850 Diversey Parkway, Chicago, Ill.
Stewart-Warner-Alemite Corporation of Canada, Limited, Belleville, Ontario

ALEMITE

REG. U. S. PAT. OFF.

**WORLD'S LARGEST MANUFACTURER
OF LUBRICATION PRODUCTS**



Power lubrication of all machines out on the job is being accomplished by many contractors through the use of this ALEMITE PORTABLE SERVICE STATION. Pumps lubricant direct from original drums; also inflates tires.

FITS 25-LB GREASE CAN

SAVES
HANDLING
GREASE



This new 25-lb. Alemite Volume Pump is made to fit standard 25-lb. grease containers with either 11 1/2 or 10 1/2-inch covers. No handling of grease. Develops needed pressure with little effort, and is moderately priced.



This new 50-LB. ALEMITE VOLUME PUMP is offered either as a complete unit with bucket, or without bucket for use on original 50-lb. lubricant container to save handling grease. Develops 3000 to 4000 lbs. pressure easily.

ALEMITE—A Div. of Stewart-Warner Corp.
1850 Diversey Parkway, Chicago, Illinois

Please send complete facts about your new FREE-FLOW Alemite Giant Button Head Fitting. Dept. C

Name _____
Address _____
City _____ State _____
Firm Name _____

Vt. Highway Rebuilt Above the Flood Line

(Continued from page 2)

yards of ledge, the second about 1 mile from the south end had 2,000 yards, the third $\frac{3}{4}$ mile from the south end had 700 yards and the last $\frac{1}{4}$ mile from the same end contained 2,000 yards of solid ledge.

These were removed by drilling with a Cleveland wagon drill and Sullivan detachable bits, driven by a 320-foot Chicago Pneumatic compressor. The rock was so hard on the northerly ledge that it was impossible to get more than 2 inches of hole per bit before resharpening was necessary. The bits were tempered by quenching in oil after the first grinding which greatly increased the depth of hole which could be drilled between grindings. A 110-foot Sullivan portable compressor was also used with I-R and C-P jackhammers for blockholing. The holes were loaded with 60 per cent du Pont dynamite which broke up the rock satisfactorily. Holes ran from 10 to 20 feet deep.

The rock was loaded into a fleet of three or four Sterling 7-ton trucks by a Lorain 75D shovel equipped with a $1\frac{1}{2}$ -yard dipper. The average haul for rock excavation was 1,000 feet while the maximum ran as high as 2 miles because of the requirement that the heaviest rock be hauled to make the riprap on the two ends of the job. The riprap extends for $\frac{1}{2}$ mile on the south end. On fill the rock was covered with a minimum of one foot of compacted earth.

Earth Excavation

The earth fills were made with the material excavated from the sidehill cuts and with borrow from the numerous pits along the right-of-way. Two methods of earth excavation were used; a pair of Carryall 12-yard scrapers pulled by RD8 tractors on the short hauls which averaged 700 feet but ran as high as 1,200 feet in some parts of the work, and the Lorain shovel loading to trucks where the average haul ran as high as $\frac{1}{2}$ mile. The output of the shovel ran about 1,500 to 1,800 yards per 10-hour day. On the Carryall scrapers the contractor replaced the standard $\frac{1}{2}$ -inch cable for the controls with a $\frac{1}{4}$ -inch cable which still fitted the sheaves well and provided a longer period of service between cable replacements.

The earth was spread on the fills by an Allis-Chalmers 75 tractor equipped with a Baker bulldozer and the final grade was struck with a Warco power grader. This same machine was also used for spreading the gravel sub-base.

Drainage and Sub-base

The condition met, with the wet clay at the base of the sidehill cuts as well as in the borrow pits, showed the need for adequate subgrade drainage. This was taken care of by the use of a considerable footage of 6-inch perforated metal pipe side drains in addition to the 18 and 24-inch reinforced concrete pipe culverts and coated and paved-invert Armco 18, 24 and 36-inch corrugated metal culverts.

The contract and specifications called for a 12-inch gravel sub-base for the entire length of the contract and this was increased to 24 inches in some sections where the clay in the subgrade was close to the surface in the cuts. The gravel for the sub-base was excavated from a pit on the opposite side of the river, requiring all the contractor's trucks to haul over the privately owned toll bridge at Cheshire Bridge. Suitable arrangements were made for the tolls so that the cost of the gravel did not run excessively high. The contractor loaded and hauled the gravel with his own equipment and spread it with the bulldozer and grader.

It was rolled to complete compaction with a 3-wheel Buffalo-Springfield 14-ton roller.

Roadway Surface

The roadway surface for this project was laid 24 feet wide. The gravel sub-base was primed with 0.4 gallon per square yard of refined tar which was applied by the producer. This application was allowed to cure for at least 2 days, or more if necessary, to prevent pick-up on the wheels of trucks, and then a second prime of 0.2 gallon was applied. This was immediately covered with clean sharp sand from $\frac{1}{4}$ -inch down by spreading from trucks with rotary spreaders at the rate of 60 to 70 cubic yards per mile of road 24 feet wide. This surface was dragged with a wire broom frame to mix the surface and then rolled with the 14-ton power roller. This completed the surface treatment under this contract.

Lubrication

The equipment of John Iafolla Con-



C. & E. M. Photo
The Tractor Operator and Helper Grease the A-C 75 and Baker Bulldozer During the Noon Hour

struction Co. is largely new and is maintained in excellent condition. The trucks are carefully cleaned and other heavy equipment is either painted or cleaned regularly to maintain its new appearance. All equipment is greased at noon during the 11:30 to 12:30 lunch hour and at night. The operator of the machine and a helper do the work. A special greaser is hired for the Le-

Tourneau Carryalls and another for the shovel. The trucks are greased every two or three days and the oil changed in all crankcases regularly in accordance with the recommendations of the manufacturers.

Personnel

Work started on this contract ER-2 with the drilling operations on April 5, 1938 and grading began April 25. The work was completed with the acceptance of the roadway surface early in October. The contract was awarded to the John Iafolla Construction Co. of Dedham, Mass., on its low bid of \$66,121.50 for the 2.3 miles of grading and the surface treatment. George J. Nolfi was Superintendent for the contractor and G. L. Perkins was Resident Engineer for the Vermont Highway Department.

The importance of proper lubrication cannot be stressed too often or too emphatically. If you have any special lubrication or maintenance problem, write the Editor.



★ WELL! WELL! It looks as though Etnyre has something new.

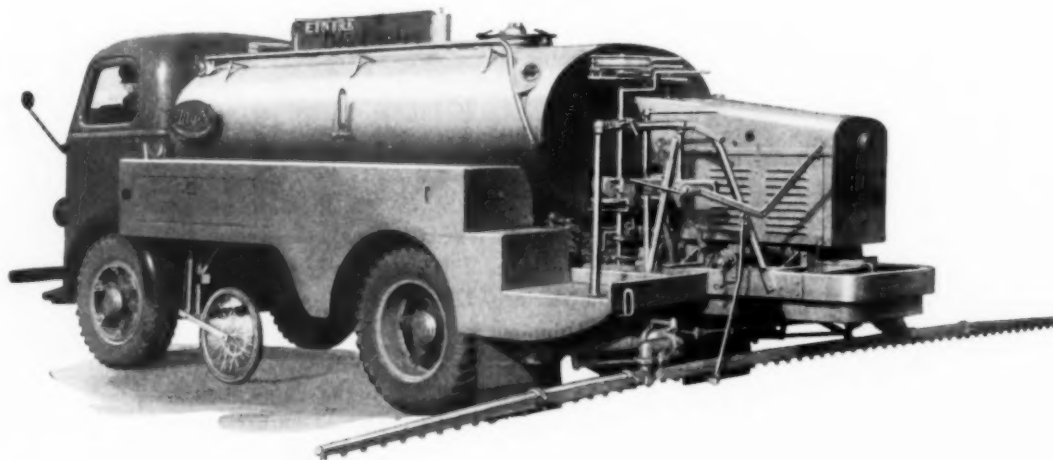
That's a swell bunch of pictures and I sure would like to have a fine-lookin' job like that to start out with this year.

Now let me see. They turn the bar up to clean. That seems funny to me for when the bar is turned up, the material can't get out. Oh yes it can. Yes, now I see.

the kind of a distributor that would save me money.

I don't know what to think of this crown adjustment, but I do know that the Inspectors and Engineers like to have the bar the same distance from the ground.

It's strange, but Etnyre is the one that always licks these problems. They must know what it takes. They raise and lower the bar with that lever to keep it always the same height from the ground. I can see how this



When you open the Vacu-Flo valve it creates a vacuum and all of the material in the bar and lines flows back to the sump and up thru the Vacu-Flo tubes into the tank. That's not a bad idea, for when the bar is turned up there is no drip and none of the material is wasted. I always said that I could depend on Etnyre to give me

crowned and tapered bar when turned up will clean quickly but I can't see how they make it fold back when the end of the bar hits something and then also folds up for traveling, but they say it does. I know it will, for you can depend on what Etnyre tells you. I am just going to find out how this is done by writing direct to



E. D. ETNYRE & COMPANY
OREGON, ILLINOIS

New Diesel Tractor Exhibited at Road Show

The new Model TD-18 6-cylinder diesel TracTractor, the latest and the largest model in the line of crawler tractors made by the International Harvester Co., Inc., 180 No. Michigan Ave., Chicago, Ill., was featured by that company at the A.R.B.A. Highway Exhibit in San Francisco this month. This new tractor has six forward and two reverse speeds, and a maximum drawbar horsepower of 70.

It is powered by a 6-cylinder four-cycle full diesel engine, with a 4 $\frac{3}{4}$ -inch bore and 6 $\frac{1}{2}$ -inch stroke. As in the case of other International diesels, the TD-18 engine starts on gasoline and after a minute or less of operation shifts to full diesel operation. A conventional automotive-type electric starter is regular equipment, and with it the engine is started easily from the seat, regardless of weather, according to the manufacturer.

Other features include a clutch brake



A New TD-18 Diesel TracTractor and Bucyrus-Erie Scraper, Owned by the Mohawk Paving Co., on a Road Job Near Penn Yan, N. Y.

for fast gear shifting; power-actuated steering clutches; adjustable steering levers and pedals to suit the operator; ball-and-socket outer pivots, special diagonal arm inner pivot bearings, and roller stabilizer to relieve the pivot shaft of twisting stresses and to keep the tracks in alignment; track shoes keyed to the

track links to eliminate loosening of the shoes; full-pressure engine lubrication at all working angles by a triple-gear oil pump; special gravity lubrication for the track rollers at low speeds, and pressure lubrication at high speeds; quintuple-sealed track rollers to keep out dirt; Tocco-hardened crankshaft with replaceable main and connecting-rod bearings; unit construction by which various parts may be adjusted or replaced without disturbing adjacent parts; and simple operating adjustments.

The tractor, which is 158 inches long, is available in two treads. The narrow tread is 62 inches from center to center of the track and the wide tread is 74 inches from center to center of the track. Regular equipment includes a precision-type diesel injection pump, 18-inch shoes, overcenter clutch, and electric starter. This new tractor is designed for use with hauling scrapers, bulldozers, winches, blade graders, rippers, tamping rollers, dump wagons, snow plows, and similar equipment.

Proper Road Drainage Will Control Erosion

(Continued from page 7)

much less to protect road ditches before gullies have formed than to fill in and sod such gullies later.

The practice of discharging run-off from diversion ditches and terraces into unprotected road ditches has aggravated highway erosion and made maintenance more expensive. Overfalls advancing up the road ditches soon cause field gullies in the ditches of each terrace. When it is necessary to empty terrace water into a highway ditch, the official charged with the responsibility of maintaining the road should be consulted and a cooperative plan worked out to protect the area from erosion.

The Soil Conservation Service of the Department of Agriculture is cooperating with most state highway departments in an effort to obtain information on the subject of economical control of erosion on highways. The procedure by which this information is being obtained is to establish various control measures on a highway in a given problem area. Once an economical solution has been provided for a particular problem, it can be applied on newly constructed highways or adapted to old highways where conditions are similar. The states have cooperated in this work and the U. S. Bureau of Public Roads has given its assistance and advice in correlating successful practices with modern highway construction.

The Soil Conservation Service is also cooperating with county and parish highway departments in controlling erosion in road ditches that are being damaged by the run-off water from the agricultural land that the Service has under cooperative agreement. It is hoped that this type of work will result in practical working relations between farmers and road officials whereby they may cooperate in preventing erosion which is decreasing land values and increasing taxation by increasing road-maintenance cost.

This text is prepared partly from Leaflet No. 164 of the U. S. Department of Agriculture. We highly recommend also a study of "American Highways and Roadsides" by Jac L. Gubbels, reviewed on page 46 of the February issue of CONTRACTORS AND ENGINEERS MONTHLY.

Streamlined Crusher At ARBA Road Show

The feature of the exhibit of the Universal Crusher Co., Cedar Rapids, Iowa, at the Highway Exhibit of the American Road Builders' Association in San Francisco this month was the new Universal streamlined crusher with 20 x 36-inch feed opening. Like other new Universal Models, this Streamliner has a frame designed to effect approximately 20 per cent savings in weight, plus greater strength and durability, according to the manufacturer.

Complete details on these new streamlined crushers may be secured by interested contractors and state and county highway departments direct from the manufacturer by mentioning this item, or from this magazine.

How To Make Cable Joints

This is the title of a new 16-page booklet on portable cable recently issued by the General Electric Co., Schenectady, N. Y., and copies of which may be secured direct from that company by requesting booklet GEA-2989. This booklet gives detailed instructions for splicing and vulcanizing all the principal types of rubber-insulated rubber-jacketed portable cable.

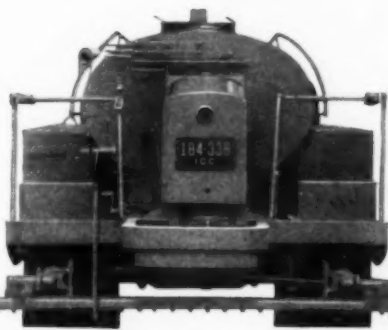
TURN-UP Folding SPRAY BAR

with VACU-FLO CLEANING SYSTEM

The 1939 Etnyre Blacktopper Model FX Distributor is equipped with TURN-UP FOLDING SPRAY BAR

A bar 24 ft. long made in sections, joined by metal to metal joints with clamp screws, quickly and easily adjustable to spray any width from 3 to 24 ft., is standard equipment. Extensions for longer bar can be furnished.

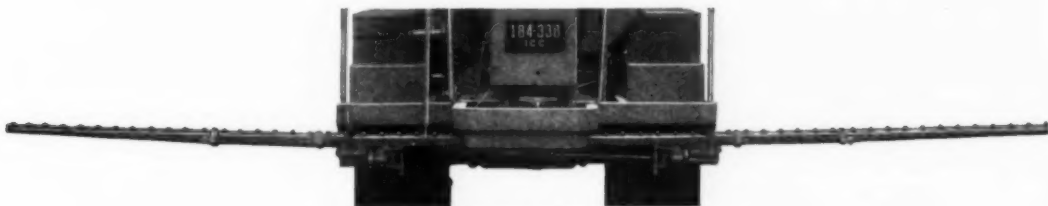
Bar is divided so that it will spray on either or both sides of center.



SPRAYING POSITION

It is of the non-drip type and is adjustable by lever to maintain constant height from ground to give uniform triple-lap spray.

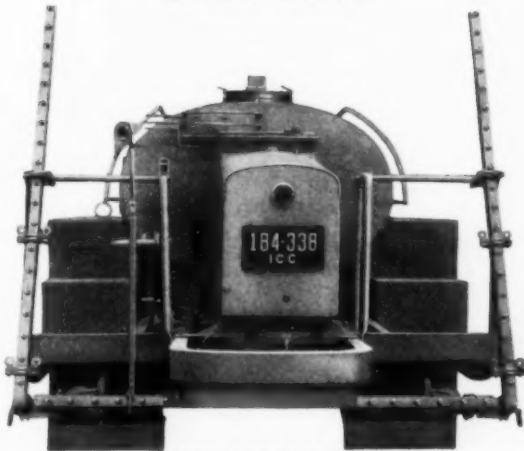
This new bar is adjustable from a straight bar for airport work to a drooping bar to conform to the crown of any road. Illustration shows the drooping bar.



CLEANING POSITION

In the turned-up position the bar and distributing lines are pitched downward so that all of the material in the bar and lines flows to the sump where the tube connections on the Vacu-Flo cleaning system pick it up and return it to the tank.

The end sections fold when the bar is in horizontal position to give traveling clearance.



TRAVELING POSITION

Should the end of the bar hit an obstruction on the side of the road while spraying, it will swing back, thus preventing damage to the bar.

★

Nozzles on 4" centers give triple-lap uniform spray with

**NO DRIPS! NO SKIPS!
NO LEAKS! NO STREAKS!**

**A SIZE FOR EVERY TRUCK
OR TRAILER**





The New H-E Snow Plow

New Snow Plow

A heavy-duty V-type snow plow with adjustable wings and full hydraulic control has recently been announced by the Bucyrus-Erie Co., South Milwaukee, Wis., as an interchangeable unit with its Bullgrader or bulldozer. The conversion is effected by removing the bolts used to hold the frame of the Bullgrader or bulldozer in place, disconnecting the lifting rods, backing out the tractor and running it into the snow-plow frame, and bolting the frame of the plow in place. The same hydraulic cylinders, hydraulic pump, control valve and attaching parts are used.

The snow plow, designed for use on an International T-40 or TD-40 tractor, is built to handle all snow depths. For light snows, speeds up to 6 mph are available, and by using both plow and wings at ground level, a path as wide as 18 feet can be cleared, according to the manufacturer. In slightly heavier snows or on wide roads, one wing can be raised to wing the snow back to the ditch while the opposite wing can be held at ground level for extra plowing width. For heavy drifts, the plow, which clears a 9-foot strip, may be used without the wings or they can be folded back or used for winging snow on either or both sides of the road. Adjustments of the wings or plow heights are made from within the cab.

The Bucyrus-Erie winter cab is especially designed for snow-removal work. Windows on all four sides insure visibility and ventilation can be changed to meet varying wind directions to afford operator comfort at all times.

Line of Expansion Joints

The line of expansion joints made by Servised Products Corp., 6051 W. 65th St., Chicago, Ill., includes premoulded asphalt joints, cork-rubber joints, plain cork joints, sponge-rubber joints, with

or without felt sides, and fibre joints, containing 35 per cent asphalt. Complete information and the specifications on these various types of joints may be secured by interested contractors and highway engineers direct from the manufacturer by mentioning this magazine.

Highway Guard Rail

Wej-Lock Super Guard highway guard rail, a single-strand fence with springs at the ends to absorb shock and keep the strand taut at all times, and offsets with flattened hook bolts to prevent vehicles from catching on the posts, is built to hold 100,000 pounds, according to the manufacturer, Wej-Lock Co., Division of A. B. Chance Co., Centralia, Mo.

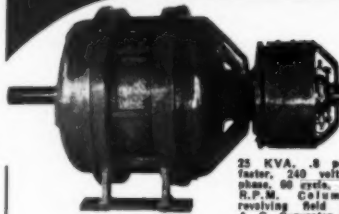
Complete information on this guard rail, with specifications and recommendations for installations, is contained in literature which interested state and county highway engineers may secure direct from the manufacturer by mentioning this item, or from this magazine.

New Magneto Designed for Use on Small Power Units

The new Type C Wico magneto, designed especially for small power-unit applications and for installation on the smaller types of tractors, was an-

nounced at the A.R.B.A. Road Show this month by the Wico Electric Co., Springfield, Mass. This new magneto is described and illustrated in a new 4-page bulletin, copies of which may be secured direct from the manufacturer by mentioning this magazine.

COLUMBIA A. C. GENERATORS



25 KVA. .8 power factor, 240 volt, 3 phase, 60 cycle, 1200 R.P.M. Columbia revolving field type A. C. Generator with direct connected exciter.

SIZES: 1 TO 156 KVA.
SPEEDS: 1800, 1200, 900, 720, 600, 450 R.P.M.
SHIPMENT: ONE WEEK TO 10 DAYS.

Columbia Generators are designed for adaptation to engine manufacturers' mountings. Send us your blueprints for quotations.

Liberal resale plan to dealers and engine manufacturers.

COLUMBIA ELECTRIC MFG CO. 4510 Hamilton Ave., Cleveland, Ohio

CHEVROLET



THE NATION'S LARGEST BUILDER OF TRUCKS Is Building Trucks for You

CHEVROLET Chevrolet builds more trucks than any other manufacturer in America because the nation has recognized their superior value and now demands Chevrolet trucks for the greatest number of its hauling jobs.

This nation-wide demand, of course, is just the total demand of thousands upon thousands of truck users who have found in the Chevrolet a truck

exactly suited to their needs.

There's a 1939 Chevrolet for You

Designed for the Load — Powered for the Pull

Now, for 1939, Chevrolet is in a position to supply the hauling needs of more industries and businesses than ever before. Now there are Chevrolets in 45 models... eight different

wheelbases... a wider variety of factory-built bodies. Now there are Chevrolets in a still wider range of capacity—all the way from speedy delivery trucks to massive heavy duty units of 14,000 pounds gross rating. Among them is a model that will fit *your* job—and bring to you the traditional Chevrolet values that have made Chevrolet the nation's largest builder of trucks.

CHEVROLET MOTOR DIVISION, General Motors Sales Corporation, DETROIT, MICHIGAN
General Motors Instalment Plan—convenient, economical monthly payments. A General Motors Value.

MASSIVE NEW SUPREMLINE TRUCK STYLING... COUPE-TYPE CABS... VASTLY IMPROVED VISIBILITY • FAMOUS VALVE-IN-HEAD TRUCK ENGINE • POWERFUL HYDRAULIC TRUCK BRAKES (Vacuum-Power Brake Equipment optional on Heavy Duty models at additional cost) • FULL-FLOATING REAR AXLE on Heavy Duty models only (2-Speed Axle optional on Heavy Duty models at additional cost)

It's a SPEEDLINE



Latest Type Speed Mixers!

Fastest, easiest handling, lightest yet huskiest mixers Jaeger has ever built—end discharge trailer type (2 or 4-wheel mountings interchangeable), need 50% less street room. **Machined Steel Drum Tracks**—many improvements. Low prices. Get Catalog.

THE JAEGER MACHINE CO.
701 Dublin Avenue, Columbus, Ohio

JAEGER

Louisiana Parish Has Culvert Casting Plant

(Continued from page 12)

The Culvert Pipe Plant

After purchasing concrete culvert pipe for some time, the parish decided that its prison labor might as well be used for the production of this type of culvert during times when they could not be used on the road. Consequently a compact plant has been set up at the prison camp where 18, 24 and 30-inch concrete culvert pipe is cast in Quinn steel forms. A platform 6 x 24 feet extends from the concrete mixer at the level of the top of the forms which are set on end around three sides of the platform. The prisoners wheel and rod the concrete in the forms and have produced a very fair grade of pipe.

Last year approximately 2,000 feet of 18-inch pipe, 1,600 feet of 24-inch and 800 feet of 30-inch pipe was produced. Pipe is poured once each day, requiring about 1½ hours, usually the first work to be done each day. The parish has the necessary forms for pouring 15 feet of 18-inch pipe, 12 feet of 24-inch and 6 feet of 30-inch pipe at one time. The cost for the finished pipe is about 40 per cent of the regular market price.

There are only four box culverts in the parish. Where larger water ways than would be provided by the largest size of culvert are needed, multiple pipe is used and there are numerous cases of four or five 30-inch lines laid side by side. These pipe are not laid with grouted joints as the Parish Engineer feels that if it is desired to move a culvert there is no need of having to destroy the bell and spigot by breaking away the mortar joint. Consequently they are all laid with butt joints.

New Jail for Prison Labor

Recently the parish built for prison labor a new jail at the site of the old wooden buildings that had housed the prisoners for many years. The building is of reinforced concrete from foundation to roof slab with non-annealable steel windows but no bars. It houses sixteen white and the same number of colored prisoners and contains a kitchen between the two quarters as well as separate shower and toilet facilities. The jail is able to care for sixty men temporarily with some crowding.

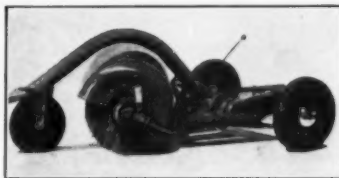
Organization and Personnel

As evidence of the care with which the parish road organization is run, bids are taken at regular intervals for the next twelve months' requirements for gasoline and diesel fuel as well as lubricants. The parish insists on the higher grades of greases and oils produced by the major oil company whose bid is accepted. They accept no bids from "wild-cat" producers who might bid low but deliver a low-grade product.

In cooperation with the Soil Conservation Service and the CCC, the parish has done considerable work in preventing further erosion of soils along the road system. The plans have been worked out by the Conservation Service and carried out by the CCC with some use of parish equipment.

Eddie Evans is Parish Engineer and is responsible for the entire construction and maintenance program of the parish under the Police Jury. Assisting him is J. C. Hedgepeth as Parish Road Superintendent, who is responsible in large measure for the field work. Only short-term prisoners are used on the road work in Lincoln Parish.

During 1937-38, Minnesota spent \$302,243.35 for sanding and ice control on its highways. This year's ice problem is reported as even more difficult.



The New Hough Traction-Driven Sweeper

New Road Sweeper

The new Hough traction-driven road sweeper, recently announced by the Frank G. Hough Co., 919 No. Michigan Ave., Chicago, Ill., is designed for use by road contractors and state, county and township highway departments. The unit is equipped with an 8-foot brush 30 inches in diameter. This brush is adjustable as to ground pressure and to the crown of the road. Power for driving the brush is taken from the left rear wheel and transmitted to the brush through a three-speed standard automotive transmission which runs in oil and is fully enclosed in a dustproof case. The brush

may be operated in either of the three speeds by shifting the gear lever into the proper position. The machine is equipped with a tow pole easily hitched to either a truck or a tractor.

A catalog describing this new road sweeper may be secured by those interested direct from the manufacturer or from this magazine.

New Sullivan President

Announcement has been made by the Sullivan Machinery Co., Michigan City, Ind., of the election of Frederick W. Copeland as President. Mr. Copeland, who recently resigned the presidency of the H. Channon Co., Chicago, to take over his new duties, was previously connected with the Sullivan organization for 21 years. Mr. Copeland's father, the late Frederick K. Copeland, served as President of this company from 1892 to 1928.

The following new directors were also elected: H. T. Walsh, J. W. Haddock, W. R. Jarvis and L. T. Noel.

PILE HAMMERS and EXTRACTORS HOISTS-DERRICKS WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York

Distributors in Principal Cities

FOR **MORE** SPEED... CAPACITY... ECONOMY... DEPENDABILITY

Cletrac offers you a choice of Gasoline or Diesel Models in a size for every job.



Your first choice is

CLETRAC

MOVING DIRT MORE ECONOMICALLY sums up the experience of Cletrac users the world over.

Here's why:

Cletrac is the only tractor with *Controlled Differential Steering* that keeps both tracks pulling at all times—on the turns as well as on the straightaway. Result—larger loads are handled...the tractor always travels smoothly...power is saved...wear and tear are less.

Cletrac's *Balanced Design* combines lightness in weight with maximum traction. Capacity on grades is increased as much as 19% on a 30% rise. Another reason why Cletracs reduce operating costs.

Cletrac's *Simplicity* makes Cletracs easier to maintain. Steering bands can be adjusted in less than 15 minutes—replaced almost as quickly. Clutch can be adjusted in five minutes and replaced without disturbing engine or transmission.

In Cletrac you'll find many features *all* of which cannot be found in any other tractor. It is a tractor worth *knowing*—for its economy; its dependability; its capacity; its speed. The nearest distributor will give you complete information and an on-the-job demonstration under your own operating conditions.



Where soil conditions permit, Cletracs and elevating graders will handle unusually large yardage. The quantity of dirt ahead of the disc illustrates Cletrac's power.

There's no whipping nor jerking of this grader from side thrust because Cletrac's Controlled Differential Steering permits the operator to follow a true, straight course.

Only plenty of power will load this equipment. Note that the dirt is rolling over the side boards of the 12 yard scraper. Cletrac delivers full loads.

Spreading piles of dirt and rocks back of 8 yard trucks takes speed. Cletrac's quick maneuverability keeps big loads moving.

The Cleveland Tractor Co., Cleveland, Ohio

22-95
HORSEPOWER

Cletrac
Crawler Tractors
Builds To Endure

GASOLINE
OR DIESEL

Tandem Paver Job Has Many Novelties

Forcum-James Constr. Co. Better 200 Feet an Hour And Has Many Original Methods on Miss. Job

(Photos on page 48)

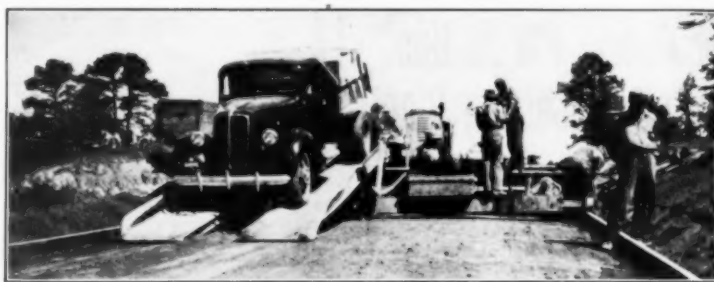
† PAVING 9.672 miles between Lexington and Pickens, Miss., last summer. Forcum-James Construction Co., of Dyersburg, Tenn., developed an organization that hit off 1,750 feet of 7-5-7-inch slab regularly on an 8-hour run and used tandem pavers, with numerous methods for improving the quality and increasing the speed of the work throughout.

The grade was roughed in by an RD6 with an Austin-Western 10-foot blade following which a Carr Formgrader cut the trenches, leaving a windrow of earth about 4 feet from the forms. An unusual characteristic of the material on this job made it necessary to watch the cross section carefully. The original subgrade was clay and loam which was topped with 12 inches of sand-clay for the entire length of the job. The topping material had the same volume when completely dry and when thoroughly saturated with water but when damp it bulked, creating serious complications between dry rough graded subgrade, planed subgrade wet and a damp final grade.

When the Formgrader had completed cutting the trenches they were trimmed by one man on each side and then a form-setter and helper on each side set the 9-inch Blaw-Knox steel forms for the 7-inch slab. Two men cleaned the

forms and then the Blaw-Knox Flynn Surgrader cut the final subgrade, removing the dirt from inside the forms to the shoulder. A team of mules with a Fresno removed any excessive accumulation of dirt from between the forms and also plowed dirt against the slab when the forms were pulled. Another novelty was a Caterpillar Twenty-Five with an 8-wheel logging wagon which was used to move the forms forward as well as carry the curing mats ahead. It was able to move heavy loads of forms over shoulders and ditches that would have been impassable with vehicles having fewer wheels and with the same load.

Behind the subgrader were one man sprinkling the grade, one man using a Lakewood form tamper which automatically oiled the forms as it tamped them,



C. & E. M. Photo

A Ford V-8 Batch Truck "Jumps" Over the Blaw-Knox Surgrader Via the Bridge

and one man who went along with a hand spray and oiled the latches of the forms so that they would not stick when it came time to knock the latches out and pull the forms. A foreman with two helpers lined up the forms and retamped them where disturbed.

At a platform carried along the grade two men cut the ties on the cement sacks, three men emptied the sacks and one man baled the bags for shipment.

A sub-foreman had the responsibility of handling the pipe lines, which were slightly complicated as it was necessary to use two pumps, a Rex pumping direct to the paver and a Barnes acting as booster to pump to the pond where the Rex was set up. There was not a running stream on the entire job so the contractor dammed each culvert on the job as soon as he started work and the

(Continued on page 34)

The sow's ear AND THE V-8 ENGINE

KINNEY DISTRIBUTOR REPRESENTATIVES This Season Will Stress Features Appealing to Owners, En- gineers and Operators.

To the Owner, faced with a natural desire for profitable operation, they will emphasize the alloy steel tank which reduces the "dead" weight by 500 lbs. (on the 1,000-gallon size)!—and the economical use of materials due to the quick stopping and starting, air operated, spray control; and the accuracy of the Kinney pump as a meter.

To the Engineer, interested in accurate application, Kinney representatives will also emphasize quick starting and stopping; the full spray even at the end nozzles; large-capacity Kinney pump; efficient heating unit, and tachometers.

Operators will be directly interested in the safety and easy handling features: fuel tank well away from the burners; ladders, and hand rails; relief valves vents, and the inside closing valve.

Of general interest to all, is the fact that Kinney Engineers rely on proved equipment—Westinghouse Standard Air Brake diaphragms to control spray; and Ford 60-hp. engine for which service is universally available.

Ask for Bulletin A

KINNEY MANUFACTURING CO.
3531 Washington St., Boston, Mass.

THE proverb says that you can't make a silk purse from a sow's ear. The quality just isn't there. It's the same with trucks. No truck can turn in a record for reliable, economical service without *basic quality*.

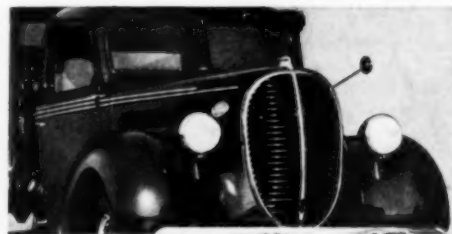
We don't point to the Ford V-type 8-cylinder engine as the chief advantage of Ford Trucks. It's only a symbol of the extra value that a Ford gives you. The full torque-tube drive, the 47 different kinds of steel, the extremely fine tolerances to which vital parts are held—any of these points of quality or a dozen others will convince you that Ford Truck construction is *quality* construction.

The Ford Motor Company is in the truck manufacturing business—and has been for twenty-one years. A point-by-point examination of a 1939 Ford V-8 Truck or Commercial Car will convince you that there is no unit in the world of comparable size and price that is better designed and better built to serve you.

CHECK YOUR TRUCK AGAINST THESE QUALITY FORD FEATURES!

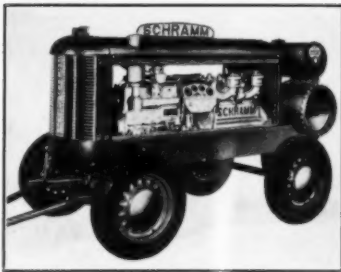
- ★ **V-8 ENGINES**—95, 85, 60 HP.—Smooth, dependable low-cost power. Quality materials and precision workmanship for efficient operation and long life.
- ★ **SEMI-CENTRIFUGAL CLUTCHES**—Non-tiring pedal action. Centrifugal force provides tremendous power-transmitting capacity. Up-keep costs kept at a minimum.
- ★ **STURDY, TROUBLE-FREE TRANSMISSIONS**—Large roller and ball bearings for all forward speeds reduce friction, save power. Oil-hardened chromium-steel gears for long service.
- ★ **FULL TORQUE-TUBE DRIVE**—Springs relieved of driving and braking stresses provide better cushioning of truck and its load. Shackle-bolt wear reduced, spring life prolonged.
- ★ **RUGGED REAR AXLES**—Driving pinion is straddle-mounted to maintain gear-tooth alignment. All truck axles are full-floating, with weight carried on axle housing—none on axle shafts. These features increase dependability and long service, reduce up-keep expense.
- ★ **BIG, POWERFUL HYDRAULIC BRAKES**—Equalized braking action for straight stops. Big brake-drum diameters and large lining areas for long brake life and low-cost maintenance.

In every detail, the quality of all Ford bodies matches the high quality of Ford chassis. Their exceptional durability means long service with low up-keep cost.



FORD V-8 TRUCKS and Commercial Cars

FORD MOTOR COMPANY NOW OFFERS FORD V-8 CARS AND TRUCKS, MERCURY, LINCOLN-ZEPHYR AND LINCOLN MOTOR CARS



The Model 105 Utility Compressor With Pneumatic-Tire Mounting

New Air Compressor At ARBA Road Show

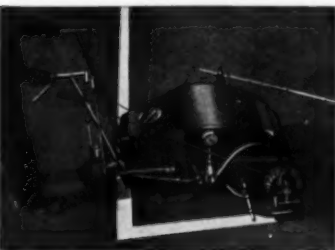
The new Model 105 Utility portable air compressor, one of a complete line of sizes up to 420 cubic feet with either gasoline or diesel power, was displayed by Schramm Inc., West Chester, Penna., at the A. R. B. A. Highway Exhibit this month. This new compressor for the construction industry has a number of new features. It corresponds closely to the design of modern automotive engines in that Schramm uses a cam-operated mechanical intake valve which permits the use of engines operating at greater speed, according to the manufacturer. Four and 6-cylinder construction has been adopted where formerly two and four heavier cylinders were used. The overall dimensions have been reduced. All models have an electric self-starter.

A new bulletin, describing and illustrating this Utility line of compressors, may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this magazine.

New Attachments for A-W 99 Motor Grader

Three new attachments for use with the Austin-Western 99 motor grader were displayed by the Austin-Western Road Machinery Co., Aurora, Ill., at the A.R.B.A. Highway Exhibit in San Francisco this month.

The first of these attachments is a rear-mounted roller which is raised and lowered by hydraulic power. It measures 6 feet in length and 30 inches in diameter and is built in three sections for operation as a 2, 4 or 6-foot roller, as desired. Each section, which may be filled with water, provides an estimated compression of 197, 252 or 470 pounds per linear inch, with a 6, 4 or 2-foot width roll respectively. When the roller operates, the rear drive wheels of the grader are elevated above the ground, the front wheels of the 99 providing ample traction and power for rolling



M-B STREET MARKER for All Types of Striping

Compact, self-propelling marking unit adaptable to all kinds of striping jobs, street center lines, parking lines, cross walks, safety zones, etc. Equipped with exhaust blower, adjustable paint box, spray nozzle and guide for marking. It cleans as it sprays as it brushes.

Saves 75% of Marking Costs

Easy, one-man, motorcycle-grip control for painting, steering and speed. No compressor required. Low initial cost. Practically no upkeep. Keeps men from dangerous hand-marking jobs. Write for new Street Marker bulletin.

Meili - Blumberg Corp.
Box C-3 New Holstein, Wisconsin



MEILI - BLUMBERG

requirements, according to the manufacturer.

The gang-disc harrow is being used considerably in the construction of stabilized roads, and the second new attachment is a two-gang disc harrow for mounting on the front end of the grader, ahead of the wheels. This harrow is also operated hydraulically and can be lowered to a maximum depth of 6 inches below the front tires. The harrow, which consists of eighteen 20-inch diameter discs spaced 4 inches apart, arranged in inverted V formation so that material travels toward the center from each side, covers a maximum width of 70 inches and each section has three angle adjustments of 5, 10 and 15 degrees.

The third attachment is a power-driven rotary broom mounted just ahead of the blade for cleaning road surfaces. It is raised and lowered hydraulically from the cab, measures 8 feet long and 26 inches in diameter, and is driven by a special hydraulic motor.

Complete information on these three attachments for the A-W 99 all-year-

round motor grader, and on the grader itself, may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

Features of Design Of Crawler Tractors

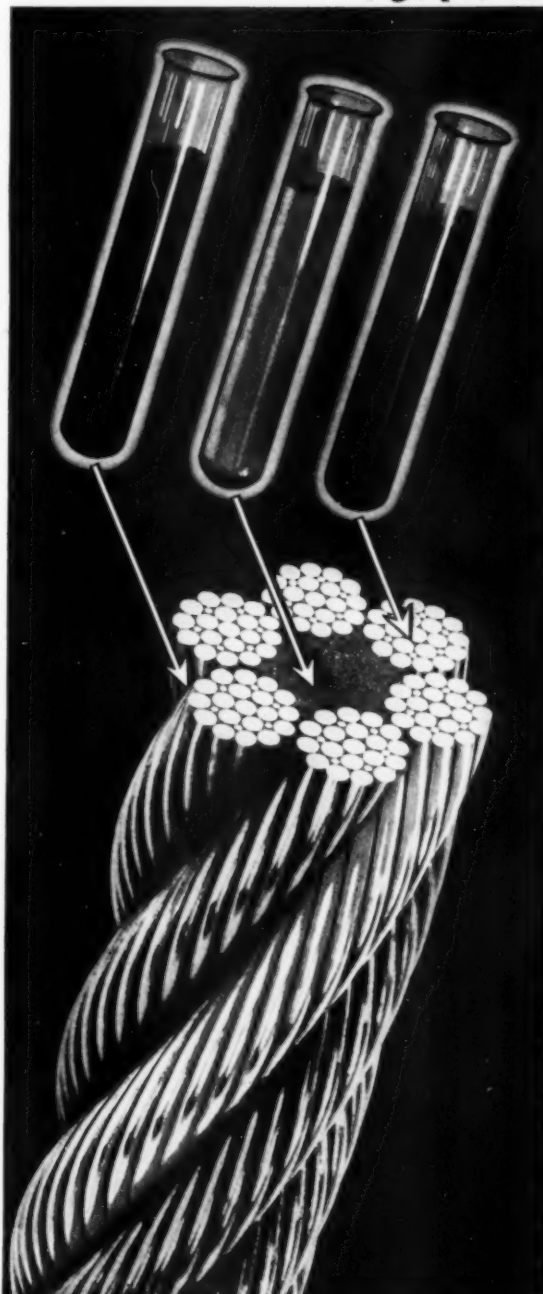
A 35-page booklet containing a digest of the design features of Cletrac crawler

tractors has recently been published by the Cleveland Tractor Co., Cleveland, Ohio. In this new booklet, each component part of the tractor has been "spot-lighted" and the elements of each group illustrated and analyzed.

Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item, or from this magazine.

RAIL CRANES SHOVELS DRAGLINES ZEE ROTATORS BROWNING PRODUCTS DIESEL GASOLINE STEAM ELECTRIC	<h2>BROWNING</h2> <p>has had no peer for 40 years</p> <p>← AT YOUR SERVICE FOR THESE PRODUCTS →</p> <p>THE BROWNING CRANE & SHOVEL CO. Established 1899</p> <p>Main Office and Factory 16225 Waterloo Rd., Cleveland, Ohio Export Department 38 Church St., New York, U.S.A.</p>	CRAWLER, TRUCK AND WAGON DRAGLINES SHOVELS CRANES - HOES BROWNING PRODUCTS DIESEL GASOLINE STEAM ELECTRIC
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PURPLE-STRAND FORM-SET WIRE ROPE



3 lubricants scientifically compounded

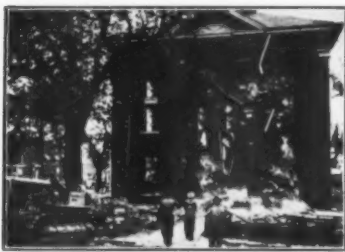
IN wire rope, proper lubrication of every part is essential to longer life. Only in this way can internal friction be cut down and the closely fitted, precision-made parts protected against corrosion and destructive internal wear.

But ordinary oil or grease cannot serve in heavy-duty rope. Nor could a single type of oil properly lubricate the 100 to 400 moving parts of a line. To overcome these conditions, Bethlehem uses three different lubricants. Each one is specifically compounded for a section of this type of cable. One lubricant keeps the hemp in the core soft and pliable. A second, used for the strands, stays in this compact group of wires and gives them lifetime protection. A third is compounded for the rope as a whole and is built in while the strands are brought together. It serves to seal out moisture and minimize friction between strands as they twist, bend and slide under bending and load.

This special, built-in lubrication is one of many reasons why Purple-Strand Form-Set is so satisfactory in service. A precision method of drawing wire is another. The use of only premium-priced steel is a third. In every detail, Purple-Strand quality is the result of long study, precision design and careful workmanship. Equally important is the fact that every step in the manufacturing process is under the supervision and control of one integrated organization.

BETHLEHEM STEEL COMPANY





A Court House Demolished by a Tractor
—But Not the Joe E. Brown Way

Unorthodox Methods Of Razing Building

When the old Bethany, Missouri, Court House had to be torn down, an unusual procedure was used to raze its sturdy brick walls. The building was approximately 42 x 84 feet and it was three stories high. Most of the interior timbers were removed, and then cables were threaded in and out of the windows and doors and attached, with a chain, to the drawbar of a Caterpillar tractor. Sharp pulls by the tractor then brought down section after section of the walls.

Curves for Highways

A handbook "Transition Curves for Highways" by Joseph Barnett, Senior Highway Design Engineer, U. S. Bureau of Public Roads, has recently been issued by the Bureau, which recommends the general use of transitions to increase safety and ease of travel and to improve the appearance of highways. The book includes a set of tables with which the design and location of curves with transitions involve only simple calculations and with which it is practicable to project an initial alignment that includes transitions for horizontal curves without material delay or expense because of the transitions. This procedure has decided advantage over projecting the alignment as tangents with simple curves and later revising it to include transitions.

Sections of the handbook discuss speed in relation to highway design, the design of curves with equal transitions by the use of tables, the design of curves with transitions as a general case, parallel transitions, transitions for compound curves, adjusting alignment of simple curves for transitions, widening pavements on curves, and right-of-way lines

SHUNK



D-K SPREADER and Finishing Machine

- Lays any type mix, hot or cold
- Lays any thickness desired
- Levels without forms
- Capacity 1000 to 1200 tons per day
- Lays variable widths from 6' to 10'
- Lays to grade

No high or low spots when re-surfacing with a D-K Spreader
Spreads and automatically grades in one operation

Finishes without forms or manual labor
LAYS SMOOTHER ROADS, FASTER AND CHEAPER

Send for information and prices.
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THE SHUNK MFG. COMPANY
BUCYRUS, OHIO, U. S. A.

in relation to transitions. All tables needed in applying the methods described are included.

This handbook, in a durable binding, may be secured by interested state and county highway engineers from the Superintendent of Documents, Government Printing Office, Washington, D.C. Price: 60 cents.

Engineering Data Book On Engine Chain Drives

An illustrated engineering data book on Silverstreak silent chain and Silverlink roller chain drives for automotive and stationary engines has recently been published by the Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind. This book will be found useful in designing drives for gasoline, oil, diesel, and steam engines, and in laying out driving connections between crankshafts, camshafts, generators, compressors, etc.

Copies of this 48-page book No. 1645 may be secured by those interested direct from the manufacturer.

Easier Loading at a Flat Digging Angle with BAKER HYDRAULIC SCRAPERS



BAKER BULLDOZERS
Sure to be found on jobs where speed, dependability and economy are vital.



Baker Hydraulic Scrapers load easier, with less power, which means greater yardages at lower costs. Sizes for 20 h.p. tractors up. Write for latest bulletins.

BAKER MFG. CO.
585 Stanford Ave., Springfield, Illinois

SCRAPERS • BULLDOZERS • ROOTERS & DISCS • MAINTAINERS • SNOW PLOWS

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CALCIUM CHLORIDE ADMIXTURE—BETTER AT LOWER COST

In concrete construction, in any weather, calcium chloride, used as an admixture, improves the quality of the concrete.

The addition of calcium chloride produces a high early strength concrete—denser, stronger, more homogenous. The "fat" mixture fills forms completely, without excess water content. Concrete cures with greater certainty and greater uniformity. Those are the advantages which calcium chloride adds to the concrete itself. Now look at what calcium chloride admixture does to your costs!

It produces control-cured concrete with minimum time and

labor. Because concrete sets faster, shores and forms may be released faster—in 1/3 to 1/2 the usual period. Because calcium chloride makes a "fat" mixture, it is handled and placed with a minimum of labor. Free-flowing concrete with calcium chloride admixture fills forms more completely, cuts down the necessary hand work in patching and finishing.

Have you the latest facts about calcium chloride admixture for concrete? Get them. Learn how easy it is to use and what you can expect it to do for your concrete construction. Write for full details today!

CALCIUM CHLORIDE ASSOCIATION
4145 PENOBSCOTT BUILDING • DETROIT, MICHIGAN



**CALCIUM CHLORIDE
FOR CONCRETE CURING**

"Safety Pays" On Every Job

Production Improves When Safe Working Conditions Are Introduced; Safety Really Pays Dividends

By G. D. GARNER, Safety Engineer,
Chicago, Ill.

† THERE isn't a contractor in the country who wants an accident to befall any of his workmen. Nevertheless, contractors and their superintendents and foremen frequently are so concentrated on production that they forget temporarily that safety and production go hand in hand on the job to make profits.

An example of this occurred recently in a small town where a contractor was erecting a six-span reinforced concrete bridge over a swiftly moving river, using green workmen furnished by the town. The carpenters working on the pier forms stood on wales and bracing, without any scaffolding. When the superintendent was advised to erect scaffolds for the safety of his workmen, he replied that this was impossible as it would make the form costs too high. As it was my job to remedy this situation and also help the contractor to keep his costs down, I undertook to show him where this unsafe working condition was really more expensive.

Noting how long it took a carpenter, standing 25 feet above the river with one foot on a wale and the other on a 2 x 6 brace to the river bed, to fasten tie rods in the pier forms, I found that more than half his time was spent insuring his safety instead of placing tie rods. Thus proper scaffolding would allow the carpenter to place a tie rod in less than half the time he was then taking. When this was brought to the attention of the superintendent, with a suggestion for a simple temporary brace which would make the erection of proper scaffolding inexpensive, he agreed that this safety measure would probably save him money and it was carried out. When the carpenters were assured of safety and could devote all their attention to their work, they placed four tie rods in the time it had previously taken them to place one.

Safety engineers are not on the job merely to criticize the practices of the contractor but rather to help him with his problems and to make suggestions and recommendations which will increase production efficiently and safely, keep his insurance rates down and prevent loss of time from the disruption of normal procedure by an accident.

Prevalent Hazards

The most prevalent hazards noted in twelve years of construction experience are exposed nails, poor housekeeping (tripping and falling hazards), improper scaffolding, poor ladders, insufficient guard rails, poorly constructed runways, and a number of others. All of these hazards are easily remedied and should be noted by all foremen and superintendents as they are the causes of most accidents, minor and serious.

One of contractors' greatest hazards is inexperienced labor, many of whom are afraid they may lose their jobs if they take time out for safety. One of the first things done on any job should be to make clear to all those connected with it that there is no penalty attached to insuring safety on the job; that a workman is more likely to lose his job if he fails to be careful and thus jeopardizes not only his own safety but that of his fellow workmen.

It frequently takes patience and understanding on the part of foremen and superintendents to train green men in

the ways of safety on construction jobs but the effort involved is always well paid for when men are working under safe conditions they produce more efficiently and profitably.

Definition of Safety

The definition of an accident is an unintentional interruption of an orderly process; a turning aside of an intended procedure. An injury to a person is only the spectacular evidence of an accident, the outward sign of something gone wrong.

We might define safety as just common sense. "Safety Pays" is a policy for action which should be followed by everyone, at work or at play, for there isn't a normal person in the world who wants to get injured. No contractor wants to see any of his men injured and there isn't a construction job in the world that is worth more than a man's life.

Want information on equipment?
Write the Editor.

Catalog on Barber-Greene Tamping-Leveling Finisher

The Barber-Greene bituminous finisher, the principle of design of which is to compact or tamp the material into place as it is being laid, and at the same time provide a level and smooth surface without the use of forms, is described in a new catalog just issued by the Barber-Greene Co., 485 West Park Ave., Aurora, Ill. Copies of this catalog may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

In addition to illustrations and specifications of this tamping-leveling finisher, the catalog contains an interesting outline of the principles of operation of the machine, with diagrams and charts to illustrate each of its operating features.

In most American cities, pedestrian fatalities account for more than 70 per cent of the total traffic fatalities, while in rural areas the percentage of pedes-

trian fatalities is somewhat less, usually below 50 per cent, making a total throughout the country of not less than 65 per cent of all traffic fatalities. Miller McClintock, Director, Yale University Bureau for Street Traffic Research, says, "The pedestrian is a party to most accidents. Make your boulevards and highways so the automobile can not get at him, and you have solved 65 per cent of the fatal accidents."

TARPAULINS ROAD MATS WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTON Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and their prices are right.

If your dealer can't supply you write our nearest office for catalog, samples and price list.

Fulton Bag & Cotton Mills

Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS NEW YORK NEW ORLEANS KANSAS CITY SAN

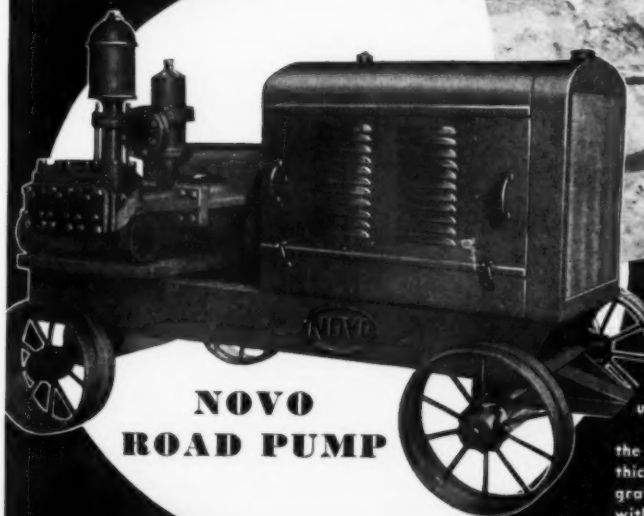
write
for
prices

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WITH NOVO PUMPS

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Road Pumps—Diaphragm Pumps—
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Did you ever see anything neater than that new Novo Lift and Force Diaphragm Pump above? That isn't half of the news about this easy-to-handle, big-capacity, utility pump.

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The greatest Road Pump Novo ever built. A powerful pump that has been designed to take the most grueling service.

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A. G. C. Standard Ratings are easily met by this pump and the lower price will surprise you.

Guard Rail

(Continued from page 2)

flatter radius curves. In Connecticut, guard rail is usually installed on all fills over 3 feet in height, although the installation is governed entirely by the individual conditions at each point. In Delaware such installations are made at fills over 5 feet in height, while in Florida fills over 6 feet in height and slopes under 4 to 1 are so protected. In Georgia, guard rail is installed on high fills, bad curves and at bridge approaches, the height of the fill requiring guard rail depending on the degree of the slope.

Wood guard rail is installed in Illinois on fills over 12 feet in height, at 12-foot fills with a 1-degree curve and on 4-foot fills with a 5-degree curve, and metal guard rail is used on 4-foot or higher fills with more than a 5-degree curve. In Indiana, it is usually left to the engineer's judgment for installation of guard rail at such hazardous points as structures where the roadway width is restricted, dangerous road intersections and similar locations, but installation is usually made on curves of 4 degrees or more where the height of the fill is 8 feet or over, on tangents where the grade is 3.5 per cent or over and the fill 8 feet or more, and on curves of less than 4 degrees the rail is placed on the outside where the fill is 8 feet or over. In Kansas, fills over 15 feet and curves over 3 degrees are protected while in Kentucky most curves over 10 degrees and fills over 10 feet between borrow pits are being protected by guard rail as rapidly as funds are available. Maine places its guard rail on fills of 4 feet or over, Maryland on embankments of 6 feet or over, and Massachusetts on all fills over 5 feet in height.

Michigan regularly installs guard rail where fill heights exceed 10 feet and carry back to approximately 7 feet, and at sharp breaks from cut to fill back to the cut point. In Minnesota, guard rail is placed on all fills over 8 feet when the slope is $1\frac{1}{2}$ to 1, on fills of 12 feet and over when the slope is 2 to 1 or 3 to 1, as well as at any points which, at the discretion of the engineer, warrant guard rail. Mississippi reports that it installs guard rail on all fills over 5 feet where the slope is less than 3 to 1 and at surprise danger points. In Missouri the installation is made at bridge ends and on the outside of curves on fills, while for the past two or three years very little guard rail has been erected in Nebraska except at bridge ends and on viaduct approaches. In New Hampshire fill heights of 4 feet or more where the slopes are $1\frac{1}{2}$ to 1 are protected by guard rail. New Jersey reports that its installations are made along fills and deep ditches. In this state fills up to $4\frac{1}{2}$ feet are designed on 3 to 1 slopes and curves are flattened and therefore are not factors involving guard rail. Both New Mexico and North Carolina install guard rail on fills over 10 feet in height, as well as at other danger points.

At one time in North Dakota guard

rail was installed on all fills over 5 feet on straightaways and on all fills over 4 feet on curves, resulting in a large mileage of guard rail in the state. This proved to be a source of continual annoyance in maintenance operations and it was finally decided to be unnecessary, so much of it was removed. The present policy for the installation of guard rail is not governed strictly by the height of fills or the degree of curvature but depends largely on the judgment of the engineer, on length of fills and gradients and sight distances when approaching fill curves. Generally, however, guard rail is used on fills of 10 feet or more on curves and on fills of 12 feet or more on straightaways.

Fills 5 feet or more in height call for guard rail in Oklahoma while in Rhode Island such installations are made on 5 to 8-foot fills with more than 3.5-degree curves. Up to about 5 years ago, fills up to 7 feet in South Dakota were made with 3 to 1 slopes without guard rail while fills over 7 feet had $1\frac{1}{2}$ to 1 slopes and therefore were protected by guard rail. For the past 5 years flat slopes without guard rail have been used on fills up to 10 feet. About 2 years ago fill slopes were changed from 3 to 1 to 4 to 1 without guard rail and from $1\frac{1}{2}$ to 1 to 2 to 1 with guard rail. In Texas guard rail is placed on fills 4 feet and more, at bridge ends, canyon edges and similar points of hazard while Virginia makes its installations on fills over 6 feet where the slopes can not be flattened, at hairpin curves on fills and at bridge approaches. In Washington guard rail is installed on narrow fills more than 10 feet in height, along streams, lakes and other bodies of water, where highways closely parallel railroads, along retaining walls and on fills in fog-infested areas. West Virginia reports that it has so little guard rail in proportion to the number of places where a glaring need for it exists that thus far protection is afforded only at points of extreme danger, such as sharp curves and high fills. In Wyoming guard rail is placed on fills over 10 feet with curves of more than 5 degrees and also on old alignment in mountain and canyon locations.

Wood Posts Predominate

In the choice of posts for guard rail, most states have selected wood, probably for the reason quoted by Vermont "because it is a native product and easily obtained." Exceptions to this are Florida and Louisiana which report 100 per cent reinforced concrete posts, Massachusetts where 95 per cent of the posts are reinforced concrete and the other 5 per cent circular steel shell anchor posts, South Carolina which reports 50 per cent of its posts of reinforced concrete, and Washington where 60 per cent are of this type.

Of the thirty-six states where the majority of the guard rail posts are of wood, thirty have treated from 50 to 100 per cent, the most usual treatment being by creosote, although tar, Wolman salts, zinc chloride and Zinc-Meta-Arsenite treatments are also reported. In some cases only the butt ends of the posts are treated but in most cases the treatment

is applied to the entire post.

In California, where 94 per cent of the posts are untreated, the posts are of redwood; New Jersey uses a very small amount of redwood posts; Oregon uses entirely Douglas fir posts, while Tennessee uses for its untreated posts either California redwood or Port Orford cedar.

In addition to the above mentioned
(Concluded on next page)

SAVE FOUR DIFFERENT WAYS WITH—



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BETTER BUILT BASKET BUCKETS

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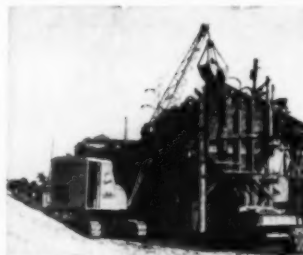
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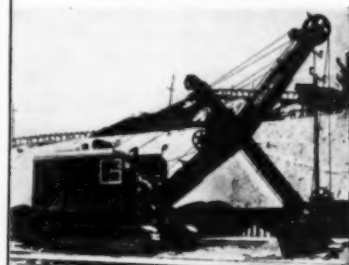
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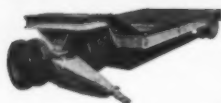
The shovel is equipped with 4-side cab, Twin City oil engine $\frac{1}{2}$ "x9"; crawler with 24" treads, 25' boom, 18' dipper sticks, $1\frac{1}{2}$ -yd. manganese front dipper, Northwest dipper trip, ratchet brake, winter fan, etc. Shovel No. 4354-5168B, Engine No. 362006, less than 3 years old. Also, 150-lb. capacity air compressor with motor, regulators and tank. Grease, vise, etc.

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**THE LARGEST TRAILER
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LA CROSSE!**

Guard Rail

(Continued from preceding page)

types of posts, there is a small amount of other types, including about 6 per cent of rolled-section steel posts in Minnesota and a considerable amount in New York where this type of post is standard. Of the metal triangular or rectangular section posts, Missouri has 5 per cent of this type and Ohio 10 per cent.

In the spacing of the posts, Maine, Montana, New Hampshire, Rhode Island, South Carolina and Vermont have standardized on 8 feet, Connecticut, Delaware, Illinois, Maryland, Michigan, New Jersey, North Dakota, Oklahoma, Oregon and West Virginia have adopted 10 feet as standard, Idaho, Minnesota and Mississippi space their posts 12 feet apart and Georgia, Indiana, Ohio and Virginia, 16 feet. Arkansas reports its posts are, set from 8 to 10 feet apart. California 10 to 16, and Colorado sets the posts for metal plate rail 12 feet apart and for cable, 16 feet. Florida, on the other hand, sets its posts 16 feet apart for metal plate and 10 feet for mesh while Massachusetts uses 8 feet as the distance between posts carrying wood rail and 10 feet for cable or tape. Kentucky used to space its posts 10 feet and now uses 12.5 feet, Louisiana, 12 and 16 feet, Missouri, 7 to 12 feet and Nevada 8, 10 and 16 feet. Kansas and New Mexico, being a bit different, have set 12 feet 6 inches as standard while North Carolina uses 8 feet for guard rail posts and 6 feet where posts only are used. Texas has adopted 12 feet 6 inches and 16 feet, Washington 10 to 16 feet and Wyoming 10 and 12 feet.

Who Makes Installation

In the large majority of states, installation of guard rail on new highways is done by the contractor as part of his contract while replacements and repairs are made by state highway maintenance forces. The exceptions to this are Illinois where 95 per cent of the guard rail is installed by a special guard-rail crew, Kentucky where all installations are done by a special crew, Minnesota where 80 per cent of the work is done by a special crew and the remainder by state highway maintenance forces, and North Carolina where special crews do 95 per cent of this work. In Connecticut, Maryland, Ohio, South Carolina, Tennessee, Virginia and West Virginia from 50 to 100 per cent of the guard rail is installed by the regular state highway maintenance forces.

Conclusions

While guard rail is recognized as a necessary protection on the highway, particularly at bridge and viaduct approaches, at drainage structures and along the outside of highways in mountainous sections, there seems to be a trend toward building safety into the highway by means of flattened slopes and the elimination of curves where new highways are being constructed and where old roads are being realigned and reconstructed. However, while this tendency may in some future Utopian day result in the elimination of the need for guard rail on most of our highways, that

time is still very far in the future. For the present, the need still exists and is borne out by the large footage of guard rail reported on state highways in the United States.

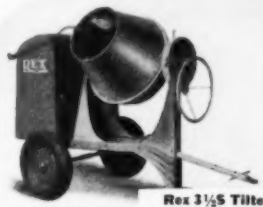
The greater need probably exists and will be present longer on county and township roads as it is not practical financially nor is it possible to eliminate hazardous conditions as rapidly on our secondary road system as needs to be done and is being done on our state highways.

New Electric Hand Saws

Two new portable electric hand-saws, one known as Model 1B with a cutting capacity of $2\frac{3}{4}$ inches and the other, Model 2AA with a cutting capacity of $3\frac{1}{4}$ inches on straight cuts, have recently been announced by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill. Both saws incorporate a number of improvements and refinements. Each has a heat-treated aluminum tilting base for bevel cuts up to 45-degree angles, new

improved and more powerful motors, and the Mall patented approved safety guard. Other features include extra large gears and pinions for long life, strong

castings which will withstand hard usage, and a special blower that clears the cutting line and keeps the sawdust from getting into the operator's eyes.



Rex 3 1/2 Tilter



Rex 75 3-wheeler

NOW! WITH MORE "REXTRA" FEATURES!

Here's the mixer line for '39 that brings more added features—more "extras" in design that mean faster, easier, more profitable mixing on every size of concrete construction job. See them at your dealers—the mixers that are better engineered—better built—of more high quality materials—the mixers for the contractor who knows that quality remains long after any price advantage disappears! Investigate today—see why "Rex is the line for '39!"

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**Cut Costs on
Maintenance**





C. & E. M. Photo
The Finisher Operator Poses During a Short Breathing Spell on the Tandem-Paver Job of Forcum-James Construction Co. Between Lexington and Picken, Miss.

Original Methods, Fast Crew on Miss. Road Job

(Continued from page 28)

early spring rains, which were unusually heavy, provided sufficient water to pave the entire job and to handle the curing. The valves on the 2½-inch water line were placed 250 feet apart and an air hose hitch of the exact type used on air-brake lines was used for the connection between the paver hose and the water line, making a quick shift possible.

A Ford service truck provided invaluable utility service on the job, handling innumerable jobs that had to be done all at once. The Surgrader carried a tool box on one of the arms for the conveyor system and on the other a drum of gasoline with a hand pump to service trucks or other pieces of equipment that were near and ran out of gas. For particularly hard spots where the usual equipment could not cut the subgrade to the required level, the contractor kept a Cleveland 5-tooth roter handy and when called upon it tore into the subgrade so that it was easy for the fresno to move the dirt.

Batching Plant Locations

On this 9.7-mile job there were four batching plant set-ups. This was done to minimize the haul of the batch trucks. The job was paved continuously from U.S. 51 on the southeast to Franklin on the northwest and the first batching location was about 2.7 miles from the southeast end. The second was 3 miles farther northwest, the third 1.6 miles northwest of that and the last about 2.6 miles from the northwest end of the job. The aggregates were stockpiled as there were no railroads available and a Northwest crane with a 40-foot boom and a 1¼-

yard Owen clamshell loaded the materials to the Johnson bins and Blaw-Knox batchers equipped with Howe beam scales. The batches were designed and consisted of 1,447 pounds of sand, 2,417 pounds of gravel, dry weight, and seven bags of cement. The water-cement ratio was 5.25 gallons per bag of cement. The batch hauling was done by a fleet of thirteen 2-batch Ford and Chevrolet trucks.

The cement was hauled 6 miles in from Picken, Goodman and Lexington where rail facilities were available and delivered to one of two platforms where the sacks were transferred either direct to the batch trucks or stored temporarily. Three men worked on the platforms loading the cement onto the batch trucks.

Pouring Slab at 218 Feet an Hour

The conversion of the aggregates and cement and water into concrete was handled by a pair of pavers working in tandem with a 30-second mix in each. The first paver, a Rex, applied all the water to the mix and then delivered the concrete to the skip of the front Koehring paver. Because there was not always complete teamwork between the two paver operators, there was some spilling of concrete onto a platform provided to catch it and pulled by the first paver. A man constantly shoveled this concrete back into the bucket for delivery to the second paver. The first paver ran free with no planers while the second had a Carr Push Planer, a Carr subgrade planer and a Carr checking template. The grade was sprinkled between the pavers by one man. The subgrade planer

on the second paver was loaded with heavy blocks of concrete and one man was used at each side to shovel out the excess dirt. Also one man was used on each side to clean out against the forms behind the subgrade planer.

Two men assembled the dowel joints along the shoulder. These consisted of sixteen ¾-inch round dowels 24 inches long carried on a transverse ¼-inch bar with depressed notches for the placing of the dowels which were tied to the transverse bars. The dowel assemblies were placed as two 10-foot panels. The assemblies for the expansion joints were identical, except that the expansion joint assembly had caps on alternate ends of the dowels and carried the 1-inch header for the open joint. When the power strike-off was passing over the expansion joint header, a lever was used to raise the strike-off over the header. The eccentric was nothing but a bent axle. The strike-off was pulled by the winch on the second paver. Two men were used to place the dowel assemblies as well as the reinforcing for the ties across the

center of the slab. These latter were ½-inch deformed bars 4 feet long and spaced 5 feet on centers.

There were two puddlers at the strike-off and four behind. Two men handed in the fabric reinforcing to the puddlers who dropped it in place. The last two puddlers stayed at the front screed of the double-screed Jaeger-Lakewood finishing machine which carried a cutting wheel for the premolded center strip. A 4-wheel bridge carried the two men who placed this strip and cut the slot for the transverse contraction joints, using a T-bar with plow handles. They also placed the ¼ x 2-inch steel for this plane of weakness which was later pulled and the joint poured with asphalt.

Finishing and Curing

Behind the bridge for the men cutting the contraction joints was the bridge for the two longitudinal float men who handled a 14-foot Carr steel channel float. With them were two men who brought back concrete for any low spots in the

(Concluded on page 42)

Now

BLACKHAWK GIVES CONSTRUCTION "BIG LIFT"!

ANOTHER

NEW 50-TON

All-Directional

Porto-Power Hydraulic Jack

ONE MAN—ONE HAND OPERATION

HYDRAULIC RAM

THREE-SPEED 75 LB. PUMP

MODEL 5-50

FLEXIBLE HIGH-PRESSURE HOSE — HIGH SAFETY MARGIN

HERE'S 50 tons of giant hydraulic power in a unit one man can carry to the job, place, and operate in ANY POSITION. Positively SAFE — all-directional ram is separated from pump for remote control. Selector valve regulates speed and capacity of ram at 15, 25 and 50 tons. When release valve is opened, ram retracts automatically, even when inverted or not under load. Speed up

a wide range of construction jobs with this remarkable Porto-Power 50-tonner and special attachments. Sleeve available for converting ram into 25-ton toe lift. Special saddles for pushing against bars, grooves or for use as wedges.

Other Blackhawk Hydraulics that Multiply Man Power

Blackhawk also offers heavy-duty, gauge-equipped, and remotely controlled hydraulics in a wide range of sizes and power. Compare the 94% operating efficiency of Blackhawk Hydraulics with the 12% to 30% efficiency of the average screw jack — and you'll agree that for performance there's nothing to match Blackhawk hydraulic jacks.

LOW COST — Superior Blackhawk hydraulics compare favorably in price with mechanical jacks. Write for data on Blackhawk products as applied to general and special construction and engineering work.

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BLACKHAWK HYDRAULICS 94% EFFICIENT

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TOE LIFT MODEL H-14
20 tons on head; 12 tons on toe; low lifting point of toe 1¼".

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WORLD'S LARGEST MANUFACTURER OF HYDRAULIC JACKS



A Sheet-Metal Cricket Trap With a Heavy Catch in Northern Nevada

Unusual Road Hazard Created by Crickets

Special Traps Are Designed to Catch Armies of Crickets Which Make Roads Very Slippery After Rains

(Photos on page 48)

† BEGINNING in the early part of June, the "Mormon cricket" (anabrus simplex) starts its march from the north towards U.S. Route 40 in northern Nevada. One of the largest concentrations of these nomadic insects is between the summit of Emigrant Pass and the City of Elko. During their trek they cross the highway and passing traffic crushes them. If this occurs immediately after rains, it creates a very slippery and dangerous condition, necessitating immediate sanding by the Department of Highways' maintenance crews.

The crickets march in large armies and live off of the vegetation over which

they pass. The male is the noise-producing member of the family and gives off a very rasping sound. The female has a strong ovipository by which it deposits its eggs in the ground. The crickets have no wings and their locomotion is very clumsy; they are able to jump only a few inches off the ground.

To combat this marching nuisance the counties affected have, with Federal and state funds, erected special fences and traps to corral the insects and keep them off the road. The fences, located along the toes of cut slopes and of fills to guide the crickets into the traps, are made of light-gage sheet iron approximately a foot high and held in place with wooden stakes driven into the ground.

The traps are fenced circle areas from 15 to 20 feet in diameter with funnel-shaped openings at the fence connections to admit the crickets. When they come to these traps the crickets crawl into them and form a cone approximately 15 feet in diameter and about 3 feet high. After they are in the trap without food they become carnivorous and attack one another until they are all dead.

Balanced Crushers Reduce Rocks to Fine in One Pass

Kue-Ken balanced crushers, designed for mounting on trucks, trailers or bin without the need of foundations, are described in detail in literature issued by the Straub Mfg. Co., 532 Chestnut St., Oakland, Calif. These crushers, which

the manufacturer states operate on a new crushing principle, are so designed and constructed that very large rocks are reduced to very fine in one pass.

Copies of Bulletin 600, giving the details of construction and operation of Kue-Ken crushers, may be secured by those interested direct from the manufacturer or from this magazine.



● Heltzel heavy duty reinforced steel road forms—guaranteed durability and longer life under all conditions. Catalog S-19-F.

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CURB AND GUTTER FORMS
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FINISHING TOOLS FOR CONCRETE ROADS

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fastest machines
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GROUNDHOG

MODERNIZE with
MARIONS
FROM ½ CU. YARDS UP

STURDY



THOMAS A. BROGAN, Yonkers, N. Y.—A Modern Marion Type 365—Diesel—1½ cubic yard Shovel used on general construction work.



ALUMINUM COMPANY OF AMERICA, Pittsburgh, Pa.—A Modern Marion Diesel Crane is being used by this company at its Mobile, Alabama plant.



TANGREDI & HESS, Inc., Reno, N. Y.—Marion Type 365—working in rock on an excavating job and giving an excellent account of itself.



UTAH CONSTRUCTION COMPANY, Ogden, Utah—A Modern Marion Type 40-A dragline loading slag near Salt Lake City.

ARBA Road Show

(Continued from page 1)

The Highways of Tomorrow theme of the convention is carried out by double spans of an elevated roadway across the end of the Auditorium in front of the great organ. The gray facade and sweeping arches are set off by the brilliant yellow of the intrados. The slogan is repeated on the other three sides of the vast hall along the balconies so that the visitor cannot fail to be impressed with the fact that engineers and manufacturers are united in the great endeavor to produce better, more economical and lasting roadways for the highway transportation of the future.

The manufacturers of smaller equipment have declared a real celebration in their exhibits which do not this year have to compete with the vast machines of the shovel and paver manufacturers for interest. The big machines are well represented by models, one of which was exhibited also at the Asphalt Conference in Los Angeles last week. This machine, reputed to have cost \$10,000 and two years to build, shows the inside working of a large asphalt plant capable of producing either hot or cold mixes.

A miracle was wrought in the Auditorium between Sunday morning and the opening of the convention today with the moving in and unpacking of hundreds of boxes of exhibit material and literature: from apparent disorder to complete order and harmony in two days. One manufacturer bids for attention by the use of "black light" and a large tractor painted with fluorescent paint so that it stands out in its corner and no one misses the sight. Another manufacturer well-known for his exhibits of models of large pieces of equipment in the past has "gone to town" with a pair of the best looking miniature dump trucks one is likely to see anywhere.

Of the larger pieces of equipment that had to be handled by hand there is a large screen that walked its way across the floor with the aid of a hand winch, and a grader 30 feet in length that seems to be the answer to a grader operator's prayer. It carries a set of disks out front, then a scarifier behind the front drive wheels, followed by a rotary broom, a grader blade and back of the rear drive and steering wheels is a roller. It was reported that one operator of a grader of this type has it equipped with a radio but the manufacturer does not even offer this as "optional equipment" in his sales literature and advertising. The machine has cab heaters that might be converted into stoves, but we don't want to put culinary ideas into the heads of grader operators.

Dioramas and illuminated panels make several of the exhibits outstanding, attention attracting and instructive. The crowd seems to be enjoying the convention, exhibits, the night spots and the World's Fair of the West.

Making a Sled for

Portable Welding Set

An ingenious sled of welded pipe was made by the operator of a portable acetylene welding outfit to increase the ease of moving this unit to any part of the job where his services might be required. Odd lengths of pipe were used. Two long pieces form the sides, and shorter pieces were welded crosswise, close enough together to support the generator.

The ends turn up at an angle, to keep things from sliding off and it was made large enough to carry not only the acetylene generator but also three oxygen cylinders, a homemade welded rack for the charging funnel for the generator, and a tray or utility box to hold small parts or tools.

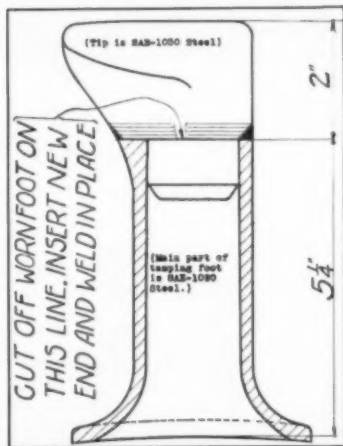


Diagram Showing Method of Renewing the Tips on the Blaw-Knox Sheepsfoot Rollers

New Device Adds Life To Tamping Rollers

A new development to simplify maintenance and increase the service life of sheepsfoot tamping rollers has recently been announced by the Blaw-Knox Co., Pittsburgh, Penna. By means of this new development, worn-out tips on the feet of Blaw-Knox rollers having serial number AE-1873 or higher may now be renewed without replacement of the complete foot.

Heretofore replacement required burning off the entire old foot, which often results in drum leakage or weakening because of holes burned in the plate. It was also difficult to weld on the new feet at these weakened spots. Under the new method, the worn-out tip is

burned off as illustrated, and the shank of a new tip inserted into and welded to the hollow shaft of the old foot.

New Method of Protecting Traffic Signs from Rust

Dip-Granodizing steel to provide a rust-resisting paint-retaining surface on metal, such as traffic warning and direction signs or any other sections of steel, large or small, is one of three processes developed by the American Chemical Paint Co., Ambler, Penna., for the protection of metals. Dip-Granodizing is a process suitable for coating either large or small parts by immersion, the metal first being cleaned of oil, then dipped in a heated solution of Granodine solution, and finally rinsed in cold and then hot water. The simplicity of the process makes it possible for this treatment to be given to highway signs in the shops or depots of state or county highway departments.

Further information on Dip-Granodizing and its uses is contained in a 4-page bulletin No. 7-6-D, copies of which may be secured direct from the company by mentioning this item, or from this magazine.

Straight-Edge Road Markers

The M-B straight-edge road marker for center-line striping, which is easily attached to any car or truck and operates as the vehicle proceeds along the highway, consists of three simple compact units: the tank and pump unit; the moving stencil or carriage for the spray-gun assembly, mounted either at the side or the rear of the truck; and the guide, securely bolted to the front bump-

er. These markers, which are designed for concrete, brick, black-top or any other hard-surfaced type of road, are described in Bulletin No. 105, copies of which may be secured direct from the Meili-Blumberg Corp., Box C-2, New Holstein, Wis.

IS IT A FORM JOB?



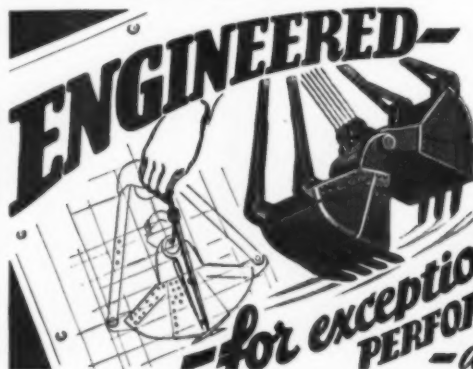
JAEGER-LAKEWOOD Automatic FINISHER:

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Heil Dig-N-Carry Scrapers are equipped with a simple, fool-proof hydraulic control system that offers these operating advantages: (1) Time-saving connecting and disconnecting requirements. (2) Fast, smooth loading in any kind of soil. (3) Wide opening, fast-acting, semi-floating front gate. (4) Fast, positive unloading of wet or dry material. (5) Convenient, fingertip control of every operation—Write, wire or phone for Heil Dig-N-Carry recommendations before you buy—Address:



MILWAUKEE, WISCONSIN **THE HEIL CO.** HILLSIDE, NEW JERSEY

Highway Mowing Unit Works All Year Round

The many uses of the Silver King highway mower, not only for mowing but as a year-round maintenance unit, are described and illustrated in a bulletin which may be secured by state, county and township highway engineers direct from the Fate-Root-Heath Co., Plymouth, Ohio. In addition to a description of this one-man tractor mower and illustrations of the Silver King on a variety of types of work, this bulletin

also lists the number of counties which are using some of these units.

New Marlow Representative

Announcement has been made by Marlow Pumps, Ridgewood, N. J., of the appointment of Luke O'Neil as special representative in the Middle West territory. Mr. O'Neil, who is well acquainted with equipment distributors in this section of the country, will make his headquarters in Chicago and will cover the states west of Ohio.

New Motor Grader Shown In Adams Pictorial News

The January issue of Adams Pictorial News, illustrating the complete line of Adams graders, featured the new No. 302 back-sloping grader recently announced by the J. D. Adams Co., Indianapolis, Ind. In addition to a large photo on the front page, there are a number of illustrations inside depicting this grader on a variety of types of jobs.

Copies of the Adams Pictorial News and literature describing the features of

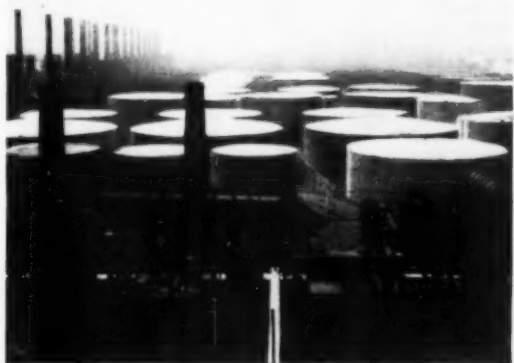
the No. 302 grader may be secured direct from the manufacturer.

Concrete Vibrator Bulletin

The features of White concrete vibrators for the vibration of mass concrete during pouring are described in a new circular No. 24-C, copies of which may be secured direct from the White Mfg. Co., Elkhart, Ind., or from this magazine. White vibrators are available in various sizes, with gasoline or electric-motor power.



CONVENIENTLY LOCATED REFINERIES assure ample stocks of any type of Asphalt product.



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every purpose*

STANDARD OIL COMPANY
(INDIANA)



The Model-C Beaver Pipe Machine

Portable Power Machine For Pipe and Bolt Jobs

A portable power adapter for threading 2-inch pipe with full-width solid dies, which is able to cut and thread up to 8-inch pipe with geared tools and drive shaft, has been announced by Beaver Pipe Tools, Inc., Warren, Ohio. The Beaver Model C is designed for either bench or stand use and is compact and safe. The gears are fully enclosed so that workmen cannot get their fingers caught in open revolving gears and the large driving gear operates through a bath of oil, reducing friction, heat, noise and wear. A conventional-type geared chuck is used, which is tightened and loosened by turning a standard chuck wrench, eliminating the severe strain imposed on gearing by chucks which are tightened with a long bar.

In addition to handling pipe, it will thread bolts up to 1½-inch, due to its rugged construction. Two men can work at the same time with this machine, one man threading and the other bending pipe or making up fittings. The net weight of the Model C bench unit is approximately 140 pounds and it is 12½ inches high, standing on a base 18 x 18 inches. The base dimension mounted on legs is 42 x 46 inches. The motor used on the Model C is a Black & Decker universal motor of ½-hp nominal rating, developing an actual horsepower of 1.59.

Speed Zoning Study

The second comprehensive report of the Committee on Speed and Accidents, Street and Highway Traffic Section, National Safety Council, which was pre-

sented by the Committee Chairman, D. Grant Mickle, Assistant Director, Michigan Highway Planning Survey, and Manager, Traffic and Transport Dept., Jensen, Bowen & Farrell, Engineers, Ann Arbor, Mich., to the Silver Jubilee Safety Congress, has just been published. This report is a special study on speed zoning.

While the Committee does not consider this as a final and conclusive report on speed regulation, it has in this report attempted to define the scope of problems presented by speeds too fast for conditions and to summarize all available information on the subject for use as background information for future factual study. The report includes a definition of a speed zone, a report on co-operative speed studies, the extent and quality of speed zoning, effectiveness of speed zones, how to select speed zones, and conclusions and recommendations.

Copies of this 48-page report may be secured from the National Safety Council, 20 No. Wacker Drive, Chicago, Ill. Single copies are available gratis.

New Rubber Air Hose

The U. S. Super Royal Cord air hose, recently announced by the Mechanical Goods Division, U. S. Rubber Co., 1790 Broadway, New York City, is a new hose, designed to meet particularly severe service demands. The special features of the hose as redesigned are the use of a high-grade synthetic rubber tube, the incorporation of a tan gum cover, and an exclusive method of bonding both the cover and tube to the hose body. The body, of cord tire construction as heretofore, has more than ample pressure resistance. Although lighter and more flexible, it is claimed to be many times stronger than necessary for actual working conditions.

This new air hose is recommended for rock drilling in quarries and similar work and for hot-oil conditions.

Welding Wrought Iron

The rapid increase in the use of welding and the fact that wrought iron differs both physically and chemically from other ferrous metals suitable for welding have made it desirable to establish recommended procedures to follow when welding wrought iron by the commonly used processes. To this end the A. M. Byers Co., Pittsburgh, Penna., has issued a revised bulletin "The Weld-

ing of Wrought Iron" which contains all the available up-to-date service data and practical information obtained in the field. Since the first edition was issued in 1934, tests have been run by the National Weld Test Bureau, Lloyd's Register of Shipping, the American Bureau of Shipping and the Bureau of Marine Inspection and Navigation and the data gathered from these tests are also included.

Plastic welding, fusion welding, manual procedure by both the oxy-acetylene and electric arc processes and carbon arc welding are discussed, with illustrations and tables to supplement the discussions of the various procedures. Copies of this bulletin may be secured by interested contractors and engineers direct from A. M. Byers Co. by mentioning this item, or from this magazine.

Funds Apportioned For National Trails

The sum of \$10,000,000 for national forest highways and trails for the fiscal year beginning next July 1 has been apportioned by the Secretary of Agriculture. The sum of \$6,666,667 represents the forest highway fund, expended by law upon those main forest roads within national forests which serve the needs of public travel. Forest highways are generally part of the state highway system and projects are selected cooperatively by the Forest Service, Bureau of Public Roads, and state highway commissions, and construction work is usually supervised by the Bureau of Public Roads. The forest highway apportionment is based 50 per cent on the net area of national forest land within each partici-

ating state and 50 per cent on the value of these government lands. The states are not required to match these funds.

A sum of \$3,333,333, the forest road development fund, is for the construction and maintenance of truck and horse and foot trails by the Forest Service within and adjacent to the national forests. These development roads and trails are essential for fire protection and administration purposes, as well as for public forest utilization, development and recreation.

The apportionment by states is as follows:

APPORTIONMENT OF NATIONAL FOREST HIGHWAY FUNDS		
State	Forest Highway Fund	Forest Road Development Fund
Alabama	\$ 92,020	\$ 27,943
Arizona	388,946	128,614
Arkansas	81,752	40,450
California	92,825	534,557
Colorado	489,680	137,480
Florida	42,495	18,498
Georgia	23,015	19,361
Idaho	687,173	492,664
Illinois	6,559	23,970
Indiana	1,514	7,711
Iowa	31	
Kentucky	12,099	36,025
Louisiana	13,573	7,430
Maine	2,549	2,137
Michigan	53,978	73,874
Minnesota	84,789	36,819
Mississippi	28,052	32,240
Missouri	28,035	46,571
Montana	535,677	323,000
Nebraska	17,409	4,540
Nevada	121,541	41,350
New Hampshire	67,116	32,706
New Mexico	273,502	109,847
North Carolina	35,332	40,479
North Dakota	24	80
Ohio	1,353	2,576
Oklahoma	53,767	4,706
Oregon	898,443	374,144
Pennsylvania	17,040	18,202
South Carolina	20,091	31,500
South Dakota	52,491	14,818
Tennessee	20,620	19,870
Texas	21,057	29,407
Utah	224,463	111,034
Vermont	8,824	8,929
Virginia	40,129	52,144
Washington	459,350	237,146
West Virginia	76,458	37,900
Wisconsin	34,632	36,922
Wyoming	295,816	106,833
Alaska	400,000	21,414
Puerto Rico	1,427	4,340
Total	\$6,666,667	\$3,333,333



SILVER KING HIGHWAY MOWER

It's a mower you can depend on in tough places—under all conditions. It's economical, highly efficient, proved by thousands of hours of service in gruelling tests. If you're looking for a mower you'll never have to apologize for—the Silver King is IT! It's a year around unit—mowing, leaf removal, snow removal. Send for the free folder illustrated above.



THE FATE-ROOT-HEATH COMPANY
PLYMOUTH, OHIO

Send for this FREE FOLDER!



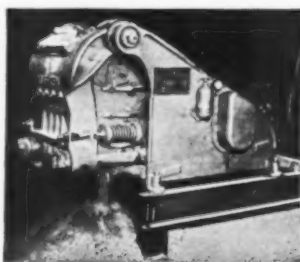
KUE-KEN CRUSHER

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OUTPERFORMS THEM ALL!

Has two to five times the capacity of ordinary crushers. Large reduction ratio usually eliminates secondary crushers, screens, etc. ¾ to ½ the weight of ordinary crushers of equal capacity. All steel construction and perfect balance make it really portable. Crushing without abrasion or rubbing, and sealing mechanism in filtered oil bath reduces wear and maintenance.

For convincing proof, send samples of your own material for free crushing test service and report. No cost or obligation. Complete details of this test are given in Bulletin 600.



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STRAUB MFG. CO.

532 CHESTNUT ST., OAKLAND, CALIF.

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law

Acceptance of Check May Prevent Further Collection

In business as well as matrimonial matters there are times when one must "speak now or forever hold his peace." Take, for example, the case of C. & R. Construction Co. v. City of Manchester, 1 Atl. 2d, 922, decided by the New Hampshire Supreme Court.

After the construction company had completed a reservoir for the city, it was discovered that the company and the city were not of the same mind as to how much money was coming to the company. The company claimed that it was entitled to pay for extras and the city asserted a right to damages because of delay in completing the work. The city sent the company a check as "the full amount due on the sixteenth and final settlement and which constitutes full and final payment under your contract." Ten days later the company had the check certified, and that is where the New Hampshire court decided that the company locked itself in a room and threw the key out over the transom. Failure of the company to reject the check as constituting final settlement was fatal. So, when it later sued for a balance claimed to be due on the contract it lost out.

The decision is in line with innumerable court decisions that have been rendered throughout the country to the effect that where there is a bona fide dispute as to how much is due on a debt, the retention of a payment tendered as full settlement forfeits any right to assert later a right to more money.

Job Abandonment Costly

When a California highway construction job was about 70 per cent completed, the contractor quit, claiming that the Highway District had broken the contract by refusing an extension of time for completion of the work, by wrongful deductions from progress payments, and by deceiving the contractor as to sub-soil conditions. The District relet the unfinished work, and when accounts were finally cast up, the United States District Court for the Northern District of California found that damages chargeable against the contractor exceeded the amount due for work completed before the job was abandoned. (Six Companies of California, Inc., v. Joint Highway District No. 13, 24 Fed. Supp. 346.)

Finding that the contractor abandoned the job without legal justification, the court was concerned only with the bases on which the District's damages were assessable. These conclusions were reached: a clause of the contract, providing for the payment of \$500 for every working day that completion of the job should be delayed beyond the time fixed for completion, was reasonable, enforceable and applicable to delayed completion due to reletting of the unfinished work when it was abandoned by the contractor. This item was figured at \$142,000. The per diem item of damage could not be computed for the time elapsing between abandonment of the work and the day when work was resumed under the reletting. But the contractor was also liable for the cost of maintaining the work after abandonment, of calling for new bids for doing the unfinished work, and other expenses necessary to keep the project in order pending resumption of work.

Thou Shalt Not Pass

The courts are in virtual agreement that a road contractor is not required to maintain a Maginot line to prevent motorists from passing from a usable portion of a highway under construction to an unusable portion. The contractor must maintain suitable warnings and barricades, and the motorist must use his eyes and brain. But a decision rendered by the Mississippi Supreme Court shows that no matter how much care the contractor may use, he cannot be sure that he will not be harassed by litigation, excepting as he may pass the "headache" on to an insurance company.

In the case of Graves v. Hamilton, 184 So. 56, a motorist passed a large sign, "Road Under Construction," and must have noticed that the pavement was newer and newer in appearance as he progressed, because he was driving in broad daylight. Finally, he crashed into a steel trailer barricade across the road where the passable portion of the highway ended. His widow and children convinced two juries that they were entitled to damages against the contractor for the resulting loss of the motorist's life. But twice has the Supreme Court thrown the case back into the lap of the trial court for another hearing.

On the second appeal, above cited, the Supreme Court held that, under the circumstances proved, the motorist was bound to know that the road was under construction and proceed with such caution as would have

enabled him to discover, and stop before reaching, the barricade.

The court notes that the law required no particular form of barricade and that failure to use the wooden barricade prescribed by the Highway Department was excusable if its use had proved to be ineffective.

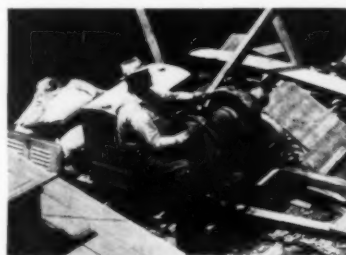
Finding the "Goat"

"Passing the buck" is a trite but apt name for a game played in the courts when a party to a contract throws on the other party a money loss that must fall on one or the other. It was played in the case of McLellan v. Brown, 120 S. W. 2d, 742. The case involved a triangle with an injured PWA laborer in one angle and a highway contractor and his subcontractor in the two remaining angles. The injury occurred while the laborer was using a defective truck furnished by the subcontractor, but the workman tried to fasten liability on the general contractor.

The Kentucky Court of Appeals decided that the general contractor was in the clear, because the subcontract required the subcontractor to furnish all labor and equipment needed in the work. This result, the court said, was not altered by the fact that the subcontract required the subcontractor to abide by the rules for the use of PWA men, and provided for payment of the laborers by the general contractor and deduction of the sums from what was due from him to the subcontractor. Nor was the subcontractor deprived of his character as an independent contractor, thereby making him and not the general contractor liable for accidents to his employees—because the general contractor locat-

ed the place where dirt should be dumped. The court also ruled that the fact that the laborer thought that he was working for the general contractor because he received his

pay from the latter did not make the general contractor his responsible boss, in face of the fact that the man was actually working for the "sub", an independent contractor.



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Ready and Able for Every Job

SPEED and hair-line accuracy for material elevator work; sustained power; sturdiness in every part for haulage and car puller service; speed and ease of handling — give this great hoist an important "edge" for pile driving work. Supreme in the 20 to 100 H. P. field. A one drum hoist can be expanded in the field to three drums and slower.

Write Dept. CE for Bulletin 100-H-1.



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THE SAFE FASTENING FOR WIRE ROPE

ALL TRAILERS are NOT ALIKE!

IF YOU are to be completely satisfied in the operation and service of the trailer you buy, you should inspect its mechanical construction carefully. Are the beams strong enough to carry the rated capacity without sagging, after several months service? Does it have bronze bushings on radius rods, brake cross-shafts, and all other points requiring lubrication? Does it have oversized, tapered roller bearings in all wheels? Does it include complete equipment? These are just a few important details to look for in your next trailer.



The new 6-wheel, 20-ton JAHN trailer shown here is typical of the entire line of QUALITY trailers now being built. This new heavy-duty model is convertible to a semi-trailer without any mechanical changes, by simply removing the front dolly assembly, (king pin fits any standard semi-automatic fifth wheel). Other important features include deep wide flange main beams, numerous cross members and gusset plates, spring mounted front dolly, internal ex-

panding brakes and the latest development in positive brake equalization.

Before you buy any trailer, check the exclusive advantages found only in JAHN SUPER-BUILT TRAILERS. Write for details.

C. R. JAHN CO.

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"Come to Trailer Headquarters"

"GIVE ME BLAW-KNOX

Self-Aligning
ROAD FORMS
every time!

They reduce my form setting costs 40%.

M'm—that's a worth while saving."



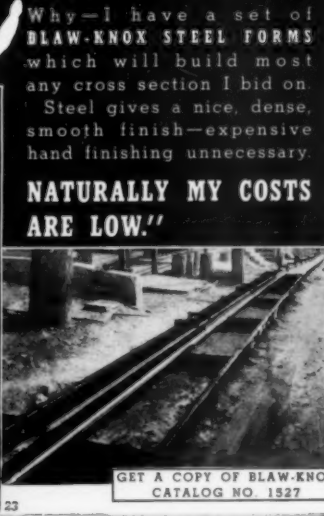
BLAW-KNOX BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
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Self Aligning **ROAD FORMS**

"HOW DO I MAKE MONEY ON THESE SMALL JOBS?"

Why—I have a set of BLAW-KNOX STEEL FORMS which will build most any cross section I bid on.

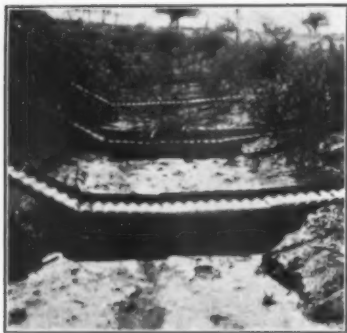
Steel gives a nice, dense, smooth finish—expensive hand finishing unnecessary.

NATURALLY MY COSTS ARE LOW."



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BLAW-KNOX BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
Farmers Bank Bldg. Pittsburgh, Pa.
Street and Sidewalk **STEEL FORMS**



Checking Erosion by Means of the New Central Ditch Checks

Metal Ditch Checks To Control Erosion

Among the difficulties encountered in highway construction and maintenance is the control of erosion. Uncontrolled water in motion is the most destructive force known in nature and erosion accounts for millions of dollars in losses when water is permitted to undermine highways and fills, destroy embankments and carry away precious top-soil. The results of erosion are evident everywhere and no section of the country escapes its share of the destruction.

Patented ditch checks for controlling erosion of ditches along highways, railroads, fields, clearings and reclamation projects have recently been announced by the Central Culvert Co., Ottumwa, Iowa. These ditch checks are composed of one or more units, each made of 16-gauge pure iron-copper alloy sheets with 2½-inch corrugations and 25½ inches in width, with a net covering width of 24 inches when one unit is lapped one corrugation by the adjoining unit. Standard units are formed under great pressure and have a dam 2 inches high, an apron 8 inches wide and an anchor 10 inches deep. They are shipped nested six in a bundle. All units, which weigh 11 pounds each, are given a heavy zinc spelter coating after forming to increase the life of the check and add extra resistance to corrosion and abrasion.

Installation is quick and easy, a maul being the only tool needed, according to the manufacturer. Units are driven into the ground to the anchor plate in the bed of the ditch, with as many additional units flanking the center one as may be required to complete the dam, each unit overlapping the next unit one corrugation.

One of the features of these checks is the shape and design of the apron. The bend that forms the anchor and apron comes at the driving point, giving a solid driving surface. Still more important, the apron receives the fall of the overflow on an erosion-resistant surface, safe-

guarding the bed of the ditch and preventing failure at a point where fills of rock or other material placed behind the dam ordinarily give way. In driving the ditch check into position, the soil is not disturbed as no excavation is necessary.

Normal procedure is to permit the ditch check to remain as a permanent installation. Ditches so equipped and properly seeded are soon covered with a dense growth of vegetation which is a further safeguard against erosion. However, if desired, the checks may be removed and relocated after the ditch has been shaped and covered by vegetation.

New 133-Mile Bridge At Jamestown, R. I.

Construction work on the Jamestown Bridge across the western passage of Narragansett Bay has been officially started by Merritt-Chapman & Scott Corp. of New York City, successful bidder on Contracts No. 1, 2 and 3 which cover the entire substructure, consisting of abutments, concrete pile bents and concrete piers. These contracts, awarded by the Jamestown Bridge Commission, total \$1,394,562 but do not include the steel superstructure which will cost approximately a million dollars more.

The bridge, which will connect Jamestown on Conanicut Island with the mainland at a point just north of Saunders-town, R. I., will be 1 1/3 miles long with approaches. The deep water section will be spanned by a cantilever truss 1,152 feet long with a 640-foot section between the two center concrete piers which will have a total height of about 200 feet above foundations. At mean high water, there will be 135-foot clearance over the ship channel. There will be 32 concrete piers to carry the steel superstructure, some founded directly on rock and others on piles. One of the main piers will extend to rock 108 feet below the water's surface. Thirty-six concrete pile bents with concrete caps, together with the two abutments, will complete the substructure. The bridge roadway will have a uniform width of 22 feet between curbs with a concrete footwalk on one side. It will be of reinforced concrete except over the main cantilever section where a modern open steel roadway will be used.

The bridge is being financed by the sale of bonds by the Commission, supplemented by a 40 per cent PWA grant.

New Electric Tool Catalog

The new 1939 catalog on the Van Dorn line of portable electric tools and accessories is now ready for distribution and may be secured by those interested direct from the Van Dorn Electric Tool Co., Towson, Md., by mentioning this

magazine. This new catalog covers 114 different portable electric tools such as drills, grinders, saws, sanders, surfacers, hammers, screw drivers, and attachments and accessories. Many improvements and refinements in previous models, as well as several entirely new items, are described.

Material Spreader

The Superior material spreader, made by the Superior Material Spreader Co., 50 Canal St., Brattleboro, Vt., is designed as a year-round unit for spreading sand, cinders, chlorides, etc., on icy roads in winter and for sand, pea or other small-sized stone and chlorides in road construction and maintenance. The spreader, which is mounted on a rubber-tired wheel, is easily attached to any standard truck by removing the tail-gate and fastening on the spreader.

In operating the spreader, the truck body is elevated until the spreader sets

level and then the truck may be driven either forward or backward as the spreader operates either way. It spreads from 8 to 24 feet and is controlled by the truck speed.

Literature describing and illustrating the Superior material spreader may be secured direct from the manufacturer by mentioning this item.

Aeroil OIL BURNING CONTRACTORS' EQUIPMENT

- KETTLES FOR TAR, PITCH & ASPHALT • EMULSION DISTRIBUTORS
- POWER SPRAYS • LEAD MELTING FURNACES • WEED BURNERS
- TORCHES & BURNERS

Send for FREE Bulletin No. 100-C

Aeroil Burner Co., Inc.
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Only HERCULES can offer the modern "TIRE-TOOL PACK" Dump Bodies and "CENTER-LIFT" Super-Power Hydraulic HOISTS

A spacious, weather and theft proof compartment is built-in under body—no sacrificing pay load—no additional mounting height. Store tire, flares, shovels, tools, etc.

Center-lift principle gives super power with less effort.

A complete line of standard design hoists and dump bodies for both light and heavy duty trucks also available.

Tail Gate Lever and control rod mounted on hoist frame—within easy reach of operator at all times.



Write for Full Facts

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

GET THIS CATALOG OF "THE PROFIT LINE FOR 1939"



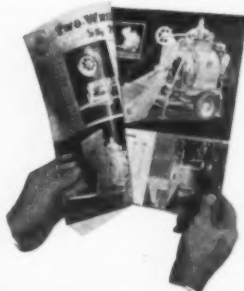
New CMC End Discharge 3 1/2 Non-Tilt. Also 3 1/2 End and Side Discharge Mixers.

CMC offers the last word in modernized Mixers, Plaster and Mortar Mixers, Bituminous Mixers—Dual Prime Pumps, Hoists, Saw Rigs, Carts and Wheelbarrows.

The new CMC Catalog is ready. It is packed with illustrations and information on the greatest line of profit making equipment in CMC's history. Write for your copy.



CMC Non-Tilt Trailers in 5s, 7s, 10s and 14s sizes. Big output with fastest handling ease.



CMC Dual Prime Pumps—a complete line from 1 1/2" to 10"—Doubly fast priming—proven stamina—efficient—economical.



CONSTRUCTION MACHINERY COMPANY,

WATERLOO, IOWA

POWERFUL, SMOOTH And DEPENDABLE

DUAL or TANDEM DRIVE

The NEW HUBER GRADER full Hydraulic control
• Permits one man to handle all work • Write to-day for bulletin.

THE HUBER MFG. COMPANY, MARION, OHIO

Buy a HUBER
ROLLERS GRADERS • INDUSTRIAL TRACTORS • HIGHWAY MOWERS



A Culvert Thawing Outfit Used in Alaska

Home-Made Thawer For Frozen Culverts

To rid Alaska's interior highways of the icy glaciers which creep down during the winter months and remain throughout the spring, members of one of the Alaska Road Commission crews near Paxson devised an ingenious means of thawing icy culverts.

The unit consists of a furnace, about 4 feet long and 2 feet wide, mounted on a truck, and is lined with a network of pipes in which steam is generated while the truck is en route. Since coal is scarce in interior Alaska and there is plenty of wood, the crew cuts wood along the road to stoke the furnace. Extension pipes and other necessary tools are carried on either side of the boiler on the back of the truck. It is believed that this thawer is a unique piece of road equipment.

New Type of Engine Announced by Mack

The first of an entirely new series of engines, named the Thermodyne to reflect the thermodynamic advances achieved in its combustion system, has just been announced by Mack Trucks, Inc., 34th St. & 43rd Ave., Long Island City, N. Y.

This series of engines, which is designed for high horsepower combined with heavy-duty service, has the conventional four-stroke cycle and carburetor and spark-ignition principle and the Mack 6-cylinder layout. Horsepowers for the complete series will range from 145 to 180. A novel feature is the arrangement of the combustion chamber, valve and porting whereby the maximum turbulence is combined with an even rate of combustion and smooth pressure rise together with high volumetric efficiency, favorable spark plug position and clean combustion and scavenging, according to the manufacturer.

In this new engine, the crankcase and cylinders are cast in a single block. Full-length water jackets assist in cooling the crankcase oil. Seven thin-shell precision bearings supported by rugged bulkheads in the deep-section crankcase provide large bearing areas. The crankshaft is fully counterbalanced by twelve large counterweights and forged integral with the shaft and has main bearings $3\frac{1}{2}$ inches in diameter and 3-inch pins. The cylinder block and crankcase casting as well as the cylinder head are made of special high-nickel-chromium semi-steel and are heat-treated. The valves, which are inclined slightly in the head, are operated by the conventional rocker-arm mechanism from tubular push rods from the camshaft. By boring the crankpins out hollow, they have been made large size without excessive centrifugal reaction, while passing the connecting rods through the cylinder with such large lower bearings has been accomplished by making a split of the cap at 35 degrees instead of the usual 90 degrees and by retaining the caps by a combination of a mortise and a tenon joint and precision cap screws. To minimize side thrust, the rods are unusually long as are the cam-ground

T-slot aluminum alloy pistons, the latter carrying five rings each and provided with a thick deck in order to carry off the heat rapidly.

The special combustion chamber is considerably offset so that a large part of the bore is covered by the flat deck of the cylinder head with a minimum clearance above the top of the pistons, and the bulk of the combustion chamber volume in the form of a D-shaped domed cavity is at one side and above the bore. Both valves open into the cavity and the spark plug is located at a focal point so that the flame propagation is rapid and even throughout the volume. Manifolding and porting are designed to provide the lowest impedance to gas flow and the most equitable distribution, thereby conducting to high volumetric efficiency and uniform combustion while the form of the combustion chamber provides high thermal efficiency.

With the exception of the line to the oil gage on the instrument board, all oil piping has been entirely eliminated. Direct pressure from the pump oils all

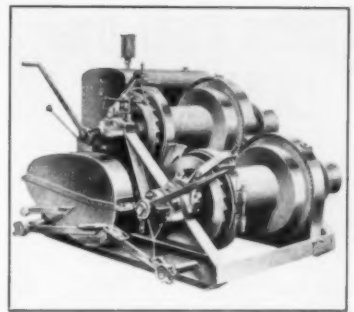
seven crankshaft and camshaft and all connecting-rod bearings as well as rocker-shaft bearings. Placed directly at the bottom of the water jacket so that it is continually water-cooled is the main $\frac{3}{4}$ -inch oil distributing tube.

Interested contractors and engineers may secure additional information on this new engine direct from Mack Trucks.

New All-Purpose Hoist

The most recent development in the Clyde line of hoisting equipment is a new all-purpose gasoline hoist with three speeds instantly available on both drums. The variation of speeds and loads is obtained through a clutch and gear shift as simple and easy to operate as an automobile, according to the manufacturer, the Clyde Iron Works, Inc., Duluth, Minn.

This new hoist is virtually a 3-in-1 unit. For heavy work there is available a 7,500-pound single-line pull at 200 fpm; for medium work, 4,200 pounds on a single line at 350 fpm; and for



The Newest Clyde Hoist

high-speed work, 2,500 pounds on a single line at 600 fpm. Power is obtained through an 85-hp industrial-type gasoline engine. The complete unit is mounted on a skid-type one-piece all-steel frame, including bearings and stands.

Complete information on this new Clyde hoist may be secured direct from the manufacturer by mentioning this magazine.

SERVICISED PRODUCTS CORPORATION



The new rebuilt and enlarged Chicago factory of Serviced. Equipped with the most modern facilities to produce our complete line of Expansion Joints, Bridge Planking, Sewer Compounds, Flooring Products, etc.

EXPANSION JOINTS—

Premoulded Asphalt Joints ..

This is the Standard Asphalt Joint containing a 70% asphalt content. Furnished with or without extrusion escape chambers.

Cork-Rubber Joint

A resilient non-oozing joint. After compression to 50% has recovery within one hour of 90—95%.

Plain Cork Joint

A resin-bound cork joint also having a recovery after compression of 90—95% with very limited extrusion.

Sponge Rubber Joint

Furnished with or without felt sides compressed to 50%. Recovery 90—95%.

Fibre Joint

Contains 35% asphalt. Compressed to 50% thickness. The extrusion practically nil. Recovery one hour 70—75%.

THE above types of joint illustrate SERVICISED service to engineers and contractors in providing both the controlled oozing and non-oozing types of expansion joint. The specifications of the various types are shown under each type and are the minimum and not the maximum tests.

Our types of non-oozing joints will not warp or shrink in the hot sun or hot weather, eliminating the necessity of wetting down before using.

The oozing types of joint are controlled by escape accessories making provision for the surplus flow under pressure. We also furnish engineers extruded joints for the reception of metal fittings and specialize on extruded products for engineers in State, Municipal, Railroad and Civil work.

SERVICISED service and performance have never been questioned and the same quality is being maintained as heretofore.

Other Products:

ASPHALT PLANK

- for Bridge Decks
- " Protection Course
- " Industrial Flooring
- " Roof Decks

SEWER COMPOUNDS

- Hot Pouring
- Tufflex
- Servitite
- Premoulded Belts
- 2 in 1 Die-Cast

Also a complete line of Flooring Products such as Rubber Tile, Cork-Rubber-Tile and featuring "Rubberlok" the Tongue and Groove Rubber Tile



SERVICISED PRODUCTS CORP. • 6051 W. 65th ST. • CHICAGO

Tandem Paver Used On Miss. Road Job

(Continued from page 34)

slab and who helped push the bridges. The two float men dropped back for hand finishing when there were delays in the work, such as bridges to be crossed. This ability of the men to do more than one job worked well for the progress of the job as they could always fill in where there were delays.

The two hand finishers used 10-foot Cleveland metal straight-edges and then pulled a 10-inch rubberized and oiled bow belt. They also went back behind the edgers and pulled a burlap drag. On an up-grade a loop of garden hose was placed behind the bow belt to prevent any water running back down the grade.

One man with a bridge edged against the forms, loosened the expansion joint header and removed the dummy strips from the contraction joints. Next, with his own bridge, came the center strip finisher, followed immediately by the finisher who cut the expansion joints and finished them and the contraction joints. In order to prevent any slump at the crossing of the center joint and the expansion joint and thus a low spot in the slab at that point, the contractor inserted a 1-inch block of wood at the intersection until the concrete had its initial set. This proved an effective way of getting around a bad situation.

A novel device for finishing the expansion joints was developed by the head finisher, making it positive that the two sides of the joint would be at the same elevation. A "go devil," the universal name all over the country for any new device that does things or goes places, was made with a cross section exactly like the slot, with a 1/2-inch fillet on either side. This block of wood was covered with sheet metal to preserve it from wear and equipped with a long handle so that it could be used from the side of the pavement as a final touch to the joint.

Four men spread wet burlap from a bridge and left it overnight, seeing that it was wet for the daytime. The next day the pavement had its third straight-edging before the cotton mats were placed. These three series of straight-edging insured a smooth pavement. The first was immediately after the drag straight-edging behind the finishing machine. The second check was made just before the burlap was spread and while the concrete was still green and was made with a heavy metal straight-edge and high spots pulled off with the straight-edge. The third and last checking was the test just before the cotton mats were placed and the concrete was cut with a shovel if found to be high in any spots. The mats were placed by a crew of six men and were left in place for 72 hours with one sprinkler for each 1,000 feet of mats in place.

Other Equipment Used

In order to be in a position to handle finishing late at night or at least after dark if something happened to require such work, the contractor had carbide lights along the job, moved ahead as required to keep them near the finishing operations.

The boss mechanic built a convenient acetylene welding outfit on a trailer for easy portability. The chassis was a Chevrolet front end on which a Modern Engineering Co. acetylene generator was mounted with an oxygen tank in front of it and with a locked box at the rear for the hose, tips and welding rods. He had also made up a convenient electric welding outfit with a Model A Ford engine driving a Westinghouse generator.

Lubrication was given an important place in the routine of this contractor.

The truck fleet was greased every night by a mechanic's helper and the heavy equipment on the road was greased by the operator with the assistance of some laborer who needed the extra hours to make up his 130-hour month. The oil in the tractors was changed after every 50 hours of operation and the truck crank case oil was changed every 400 to 500 miles. As "Refund Gas" was used, one man was placed in charge of all gasoline supplies to prevent any misuse of this gasoline. Pure Oil and Gulf lubricants were used on the job.

Personnel

The contract for the construction of Project PWS 108 and Extension for a distance of 9.672 miles between Lexington and Pickens, Miss., was awarded to Forcum-James Construction Co., of Dyersburg, Tenn., on its bid of \$187,029.70. For the contractor the work was in charge of Joe Carter as Superintendent. For the Mississippi State Highway Department the work was under the care of C. J. Campbell as Project Engineer.

New Super-Traction Tire Line Announced

Six new super-traction tires for off-the-highway service, especially in mud or snow, have been announced by the B. F. Goodrich Co., Akron, Ohio. The first of these are the Truck-Bus super-traction tires in a complete range of sizes, both balloon and high pressure, with broader flatter treads and a deep self-cleaning design for sure-footed traction in mud or gumbo.

Other new tires of this type are the Heavy Duty for concrete batch trucks and similar heavy equipment; the Commercial for use on 1/2 and 3/4-ton trucks; the Tractor Grader for graders and other road machinery; the Heavy Duty for 1 1/2-ton trucks; and the Trailer Type for free rolling wheels on scraper wagons and other heavy-duty earth-moving equipment.

The development of these six new tire lines follows the trend of specialized engineering to meet specific tire needs, each being designed to do a particular type of job. All have the Goodrich construction features, triple protection at the failure zone, a positive check against 80 per cent of all premature sidewall failures, and the new Hi-Flex tire cord to give added strength to the carcass.

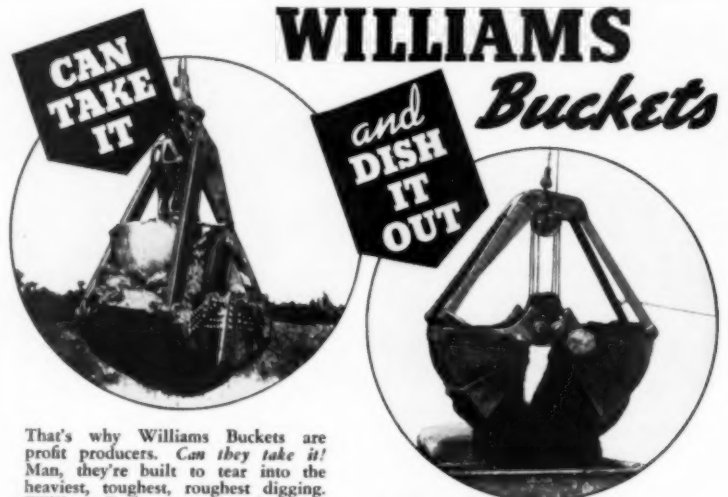
Steel Products Manual

Section 4 of the "Steel Products Manual" being issued in sections by the American Iron and Steel Institute covers the subject of rolled steel structural sections. Realizing the need for clarification of terms and standardization of many practices within the industry, the Board of Directors of the Institute requested the Technical Committee to conduct a study having the following major objectives: 1. To classify and define products of the industry, as far as possible; 2. To collect and present manufacturing tolerances that might be considered as standards for the industry; 3. To collect information relative to

standard methods of inspection; and 4. To review existing specifications that might be considered acceptable to the industry as standards.

The results of such a study of rolled

steel structural sections is contained in this Section 4, copies of which may be secured from the American Iron and Steel Institute, 350 Fifth Avenue, New York City. Price: 15 cents each.



That's why Williams Buckets are profit producers. *Can they take it!* Man, they're built to tear into the heaviest, toughest, roughest digging. Williams Buckets stand up for years under most gruelling service. *And can they dish it out!* Just watch a Williams Bucket come up with a full capacity bite, and dump the load swiftly and cleanly . . . then swing back ready to wade into action again. Yes sir, Williams Buckets are truly

**BUILT TO LAST . . .
and MOVE DIRT FAST!**

. . . and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

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Send for Catalog. Distributors located in all parts of the Company represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

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In HIGH PLACES—or LOW

**thru Summer
and Winter . . .
Lansing F-4 1/2
Concrete Barrows
Carry on—**



With Pneumatic Rubber Tire

with perfect ease and safety. For these husky barrows (pneumatic tired) will take the bumps with a full load—anywhere. Load 'em—wheel—and dump . . . day after day, with never a complaint. Your investment in Lansing barrows will bring you better profits. Look into the barrow problem—NOW!

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EQUIPMENT FOR CONTRACTORS

Wheelbarrows Concrete Carts Mixers Dump Trucks Scrapers
Hoists Hand Trucks Tool Carts

BUILT-IN STABILITY—SINCE 1881

ASPHALT PLANTS

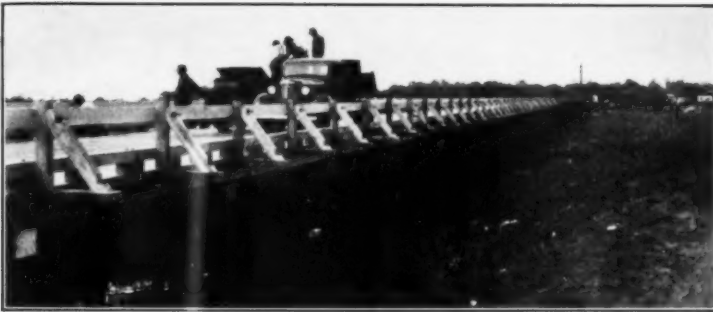
**HOT & COLD MIX—ANY CAPACITY
PORTABLE OR STATIONARY
STEAM—ELECTRIC OR DIESEL**



**THE SIMPLICITY
SYSTEM COMPANY**

CHATTANOOGA, TENNESSEE





C. & E. M. Photo
The Darien Detour Bridge Which Is Now Carrying Heavy Tourist and Citrus Fruit Traffic on the Coastal Highway in Georgia

Temporary Bridge

(Continued from page 9)

section and 2 feet 11 inches long. There is one line of hand-rail to the side, made of 3 x 8-inch timber and fastened to the posts with $\frac{3}{8}$ -inch round 16-inch carriage bolts and two 40d nails. There are also 4 x 6-inch knee braces 3 feet 9 inches long at each post.

Surface Treatment

To protect the surface of the bridge it was surface-treated by state maintenance forces. The hub guards and hub-guard blocks were sprayed with pine tar and thoroughly swabbed. The pine tar was heated in a Littleford 200-gallon kettle and the material applied by a crew consisting of one man on the burner and feeding the cold material to the kettle, one man on the hand spray pump, one spray man and two swabbers.

The roadway surface was also sprayed to preserve the timber and then a wearing coat applied consisting of a tack coat of asphalt with a penetration of 200 and a coating of $\frac{3}{4}$ -inch stone. This was double-sealed with cut-back asphalt and a top blotter of No. 7 stone applied.

Personnel

This detour bridge at Darien, Ga., was built by the Espy Paving & Construction Co. of Savannah, Ga., under the direction of E. A. Logan, Division Engineer, Division 6, Georgia State Highway Board, and J. G. Brock, Resident Engineer. D. E. Oliver was Foreman in charge of the maintenance crew.

New Novo Equipment At ARBA Road Show

New diaphragm, self-priming centrifugal, pressure and road pumps and a new heavy-duty line of power units were exhibited at the Road Show in San Francisco early this month by the Novo Engine Co., 216 Porter St., Lansing, Mich.

In addition to the new diaphragm pump, there is a new Novo road pump which retains the features of previous models but on which the drive has been simplified by a direct chain drive from the engine to the pump intermediate shaft, eliminating two gears and a drive shaft from the engine. These pumps are made in sizes of 80 gpm at 500-pounds pressure, 100 gpm at 600-pounds pressure, 125 gpm at 500-pounds pressure and 150 gpm at 400-pounds pressure.

A feature of the new complete line of Novo self-priming centrifugals is the pump design which results in the pressure from the discharge acting against the seals around the impeller shaft instead of the usual vacuum. The impeller is easily removed by taking off the outer pump plate. There are ten sizes in this new line, all complying with A. G. C. standards. To fill in between the Novo medium-duty pressure pumps and the road pump, a new heavy-duty duplex double-acting pressure pump has been announced. This pump can be equipped with various liners for changing the capacity, bores of $2\frac{1}{2}$, $3\frac{1}{2}$ and 4 inches

being available, all with a 6-inch stroke, varying the capacity from 33 to 95 gallons per minute and pressures from 800 to 300 pounds. Liners, valve service, pistons and piston rods are interchangeable for various types of work, such as handling water, oil or slush. Power is furnished by gasoline or diesel engine or electric motor.

The new heavy-duty power units, with single, two or four cylinders, include Model CW-33 of 4 to 5 hp, CW-47 of 5 to 7 hp, CW-66 of 8 to 11 hp, CW 95 of 10 to 15 hp, and CW-133 of 16 to 22 hp. Features of these new units include large oil and gasoline capacity, extra-heavy crankshaft, large roller and ball bearings on the crank and cam shafts, the Novo gear oiler and a heavy flywheel for low-speed lugging ability and smoothness.

Hurley Becomes Vice Pres. Of Pneumatic Tool Company

Neil C. Hurley, Jr., for the past four years Secretary of the Independent Pneumatic Tool Co., Chicago, Ill., was recently elected a Vice President. Mr. Hurley has been associated with the company since 1932.

Essentials for Ideal Maintenance Garages

(Continued from page 17)

we have six, and at the central office a larger more completely equipped garage is maintained. General overhauling jobs on the larger units of equipment are usually done in these district garages. Each of these district garages also contains a paint shop where road signs are cleaned and repainted.

At Sioux City we have a modern fire-proof hollow-tile building which is representative of our district garages. This building is 162 feet x 34 feet overall. It is divided into three main divisions: a repair shop 65 x 32.9 feet; a storage space 55 x 32.9 feet; a sign paint shop 29 x 32.9 feet.

Between the repair shop and the storage space there is a 9-foot section running from the front of the building to the rear which contains a forced air furnace for heating the repair shop and storage space, a tool and supply room and a toilet.

The paint shop is divided into two rooms, one a cleaning and painting room and the other for packaging and shipping the signs. These rooms are both 29 x 16 feet. A separate furnace heats this paint shop.

German Roadside Planting

Highways in Germany have been beautified by planting fruit trees along the roadside, according to a recent issue of *Highway Research Abstracts*. Cherry, apple, pear and walnut trees are placed 32 feet apart along each side of the road, the fruit being sold at auction on the trees and harvested at the purchaser's expense. The amount realized is applied to the maintenance of the system, the planting and cultivation of young trees.



Galion No. 178 leaning wheel grader with pneumatic tires

Pull graders—from the light No. 70 with 7 ft. moldboard to the big No. 112 with 12 ft. moldboard, the Galion line of leaning wheel graders is complete. A unit of the size and weight, with manual or hydraulic control, for any maintenance or ditching work that you may have.

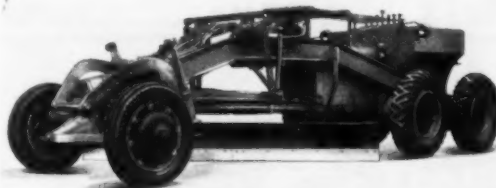
Motor patrols—three models to choose from with choice of power and wheel equipment. Junior, standard and Master diesel . . . all equipped with many features and modern developments to make for greater operating economy.

Spreaders—for spreading chips, stone, asphalt, sand, cinders and other surfacing material to any desired width. Also road widening spreaders and sanders. All practical and efficient units to do the job better and more economical.

Rollers—3-wheel, tandem, International, sheepfoot, portable and trench rollers . . . the most complete line of rollers to be found anywhere. Diesel or gasoline power. Investigate Galion rollers.



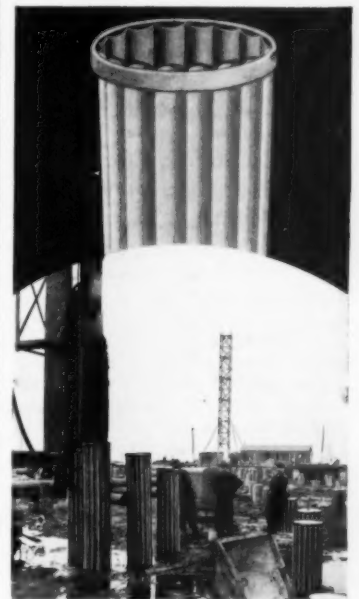
Galion chip spreader which spreads material to a uniform width of 10 feet. Below—Galion standard motor patrol grader.



The Galion Iron Works & Mfg. Co.

Main Office and Works:
Galion, Ohio

Export Division:
Columbus, Ohio



You Can Drive Union Metal Fluted Steel Monotube Piles Hard and Fast

● A tough pile that drives without core or mandrel—that's the Fluted Steel Monotube. Its heavy, fluted steel wall has all the strength and rigidity required for hard driving. Faster driving is a certainty because none of the hammer's force is dissipated driving useless weight.

Remember, too, that the Fluted Monotube pile costs less to handle, offers the combined structural strength of steel and concrete, and is easily inspected after installation.

All of these advantages are described in detail in Union Metal Catalog No. 68. Write for it today.

Visit Union Metal Exhibit at the San Francisco Road Show. Space C-10.

THE UNION METAL
MANUFACTURING CO.
CANTON, OHIO

CONTRACTORS AND ENGINEERS MONTHLY 470 Fourth Avenue, New York

Enclosed is my remittance of \$2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

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N. B. A two dollar bill, check or postage stamps will be entirely acceptable.

Road to Famous Fort Rebuilt for Tourists

Frederica Road on St. Simons Island Widened and Paved with Tar Pre-Mix Between Seasons by Glynn County in Georgia

† FORT FREDERICA on St. Simons Island off the coast of Georgia near Brunswick was built in 1736 by General Oglethorpe as a defense against the Spanish invasion and for the protection of the Georgia and Carolina colonies. Today there is another invasion that requires defensive action. Hordes of tourists have found the old Fort on the map and journey out onto the picturesque island to visit the structure built of thick walls of oyster-shell masonry. Fully as many tourists visit the same island to see the shrine of Charles and John Wesley who first preached in the churchyard of Christ Church to colonists and Indians two centuries ago. This small church beneath an arch of protecting live oaks is on the same road as the Fort.

Glynn County found it necessary to protect the visitors as well as the road itself by a project calling for regrading, drainage structures, selective clearing and the construction of a 20-foot wide 5-inch thick pre-mix tar base with a single surface treatment. As there are two tourist seasons in Georgia, the work was planned for construction in 60 days starting early in April, 1938, and with a \$40 a day bonus and penalty clause in the contract. The winter tourists had just left and it was required that the road be ready for the summer tourists who start visiting St. Simons Island in June.

Regrading and Drainage

Of considerable interest in the regrading and slight changes of alignment of this road was the need to remove a number of the old live oaks. These trees festooned with hanging moss are things of great beauty by day and eerie by night. By selective clearing and making slight changes in the best theoretical alignment many of the trees that might ruthlessly have been destroyed were saved and at the same time a number of trees were removed that were actually found to be in bad condition and real hazards.

Unusual care was required in regrading because of the heavy shade of these ancient live oaks and the need of maintaining a good subgrade. All material from roadway excavation was placed on the slopes below the elevation of the present subgrade and selected borrow was specified for the fills under the base course and shoulders. The special borrow was top soil, secured from borrow pits from which the loamy top soil had been stripped, and filled the requirements for the sand for the tar pre-mix base.

All fill was rolled with a 5-ton roller in 6 to 8-inch layers with all roots carefully removed by hand. The contractor's tractors and trucks were required to run

over the fills in all their work to aid in compaction of the fills as paving was to follow the grading as part of the same contract. A Caterpillar Thirty-Five diesel was used for the lighter stump pulling and for general grading and a Bucyrus-Erie crane with a 1/2-yard clamshell bucket excavated the material for the fill.

The culvert pipe is of concrete, set with a slight camber against the possibility of settlement after the fill was placed over it and traffic finally compacted the entire roadway area.

A double 5 x 5 creosoted timber culvert, with 20-pound treatment, was placed in the one opening of any size. The stream is tidal and the use of creosoted timber was considered advantageous because of the speed of construction and the salt water.

Tar Pre-Mix Base Course

The contract called for pre-mix equipment with a capacity of 40 tons per hour, using the fine local sand 80 per cent of which passes an 80-mesh sieve and 2 per cent of which passes a 200-mesh sieve. The sand in the area selected for the borrow pits has a stability of 46, putting it in the class of the famous Daytona Beach sands where automobiles raced against time before the Utah salt flats were discovered as the ideal racing arena.

The contractor used a pair of Koehring Kwik-Mix machines for the tar pre-mix, hauling the material to the road and spreading from piles across the road with a road machine.

The Surface Course

For the surface treatment top considered necessary because of the oxidation of the tar base course, 0.35 gallon of 175-200 penetration asphalt per square yard was applied to the complete base by a 600-gallon pressure distributor. This was covered with 40 pounds of 1/4 to 3/4-inch crushed slag per square yard. This was drag-broomed and then rolled with a 5-ton roller.

Personnel

The survey for the Fort Frederica Road was made in February, 1938, the bids were received in March, work started in April and the job was completed in June. The contract was awarded to the Manley Construction Co. of Ocala, Fla., on its low bid of \$17,980. Cecil Scott was Superintendent for the contractor and the work for Glynn County was under the direction of H. J. Friedman, County Engineer.

Alemite Announces Changes In District Sales Managers

Announcement has been made by C. A. Fine, Sales Manager of the Alemite Division of the Stewart-Warner Corp., Chicago, Ill., of a number of appointments and changes in territory of Ale-



C. & E. M. Photo

Clearing a Cut-Off on the Fort Frederica Road on Famous St. Simons Island Which Furnished the Timbers for Old Ironsides

mite district sales managers. J. C. Harger, former Southwest District Sales Manager, has been transferred to take charge of the southeast sales territory while A. F. Haberl, formerly manager

of the southeast sales district, is now District Sales Manager in the east-central territory. Roy A. Sands has been appointed District Sales Manager of the southwest.



● New Heltzel heavy duty steel forms for combined curb and gutter construction. Face form removed without disturbing front rail, back rail or division plates. Catalog S-20.

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

Heltzel
BUILDS IT BETTER

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHEMERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS

Concrete VIBRATORS AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

IN NEW YORK
HOTEL McALPIN
"A GREAT HOTEL"
LARGE ROOMS, NEWLY FURNISHED & DECORATED
SINGLE from \$3.00
DOUBLE from \$4.50
1 BLOCK FROM PENN. STATION
B. & O. Motor Coaches stop at our door.
SPECIAL FLOOR DEVOTED TO WOMEN GUESTS EXCLUSIVELY
HOTEL McALPIN
BROADWAY AT 34th ST., NEW YORK
Under KNOTT Mgt. John J. Woellie, Mgr.

ROGERS has built HEAVY DUTY TRAILERS exclusively FOR 25 YEARS

● EXPERIENCE built it...
ROGERS BROTHERS CORPORATION
108 Orchard St., Albion, Pa.
● PERFORMANCE sold it...
This experience assures getting a trailer exactly suited to your needs—
designed for strength with lightness—
that hauls faster with less power—
that is under safe, dependable control at all times.

DIRECTORY OF EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

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BROS. Bulldozers, Angle-dozers, Snow Plows
BUCCYRUS-ERIE Shovels
BUFFALO-SPRINGFIELD Rollers
CLETRAC Tractors
CLEVELAND Rock Drills

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"Pioneers in Good Merchandising"

TUCSON ARIZONA

DAVENPORT Rippers & Drift Mining Equipment
GALION Graders and Rollers
McCORMICK-DEERING Industrial and Crawler Tractors
McCORMICK-DEERING Diesel and Gas Power Units
STERLING Hoists
STERLING Portable Pumps

P. & H. Shovels & Etc.
Welders
POMONA Turbine Pumps
MYERS Pumps
KIMBALL-KROHN Centrifugal Pumps
TOLEDO Road Trenches
WOOD Hand Shovels

GARLINGHOUSE BROS.

2416 E. 16th St. Los Angeles, Calif.

Southern California Distributors for

RANSOME—Concrete Mixers, Pavers, Pneu. Planes, Grouters, Concrete Paving Equipment
WORTHINGTON—Portable Compressor, Pneumatic Tools, Jackhammers, Pumps, etc.
BROWNING—Truck Cranes, Shovels, Locomotive Cranes
OWEN—Climax Shovels
OMAHA—Dragline Buckets
WHITCOMB—Gasoline, Diesel, Electric Locomotives
A. LESCHEN & SONS—Wire Rope
MCKIERMAN-TERRY CORP.—File Hammer
LAMBERT-NATIONAL—Hoists and Cableways
DIAMOND IRON WORKS—Crushers, Portable Gravel PL
RAMSEY—Hand and Power Winches
NOVO—Engines, Pumps, etc.
UNIVERSAL—Panel Forms, Form Clamps, etc.
Manufacturers of Gar-Bro Concrete Cars, Wheelbarrows, Concrete Hoppers, Buckets, etc.

EDWARD R. BACON CO., INC.

Folsom at 17th St. San Francisco

Aerol Elevation Drills
Allis-Chalmers Tractors
American Concrete Grinders
Byers Shovels, Cranes
Carlowe Bit Grinders
Cedar Rapids Crushers
Cleveland Rock Drills
Cleveland Tractor
Dobbie Derricks, Pitting
Erie Rollers
Hercules Chip Spreaders
Hercules Power Units
Hough Universal Scrapers
Huber Rollers
Interstate Trams
Jackson Concrete Vibrators
Jager Mixers, Pumps, Hoists
Paving Equip.
Johnson Bins, Batches

Member: Associated Equipment Distributors

NORRIS K. DAVIS, INC.

400 Seventh St. San Francisco, Calif.

LE ROI CO.—Gasoline Power Units and Parts
MINN. STL. & MACHY. CO.—Twin City Engines, parts
HANSON CLUTCH & MACHY. CO.—Full Revolving Shovels, Cranes, Draglines, 5, 6, 8, and 10-yd.
KEYSTONE DRILLER COMPANY—Exhausting Machines, Shovels, Cranes, Draglines, Pull-Scrapers, Skimmers, Plunger Shovels, Pavement Breakers
DAVIS COMPANY—Large Tilting Mixers, 1, 2, 3, and 4-yd. Weigh Batches, Batching Plants, Manual or Full Automatic Operation, Ready-Mix Concrete Plants and Equipment, Motor Truck Concrete Mixers and Carriers, Electrically Operated and Controlled Water Meters, Steel Silos, Bins, Bunkers, Hoppers, Bunker Gates, Chutes
O. K. CLUTCH & MACHY. CO.—Hoists & Compressors
CONSTRUCTION MACHY. CO.—Wonder Mixers, Hoists

GARFIELD & CO.

Hearst Building San Francisco

Representing

LINK-BELT Shovels, Cranes, Draglines
BAY CITY Shovels, Cranes, Draglines
PLYMOUTH Gas and Diesel Locomotives
INDUSTRIAL BROWN HOIST CRANES
WORTHINGTON Compressors, Drills, Pumps
ATLAS Battery Locomotives
AUSTIN Trenching Machines
PACIFIC Steel Crushers
LEACH Concrete Mixers
ROGERS BROS. Trailers

LLEWELLYN MACH. CORP.

1030 N. Miami Ave., Miami, Florida

Amer. Car & Foundry Co.
Amer. Saw Mill Machy. Co.
Ames Baldwin Wyoming Co.
Anchor Concr. Machy. Co.
Atlas Imp. Diesel Eng. Co.
Barber-Greene Co.
Bostons Mfg. Co.
Climax Engrs. Co.
Century Electric Co.
Coffing Hoist Co.
Coldwell Lumber Mower Co.
Congress Tool & Die Co.
Henry Diston & Sons, Inc.
Elkhart Rubber Works
Forest City Bilt & Tool Co.
Gallagher & Livingston Co.
L. H. Gilmer Co.
Goulds Pumps, Inc.
Hercules Motor Corp.
Hewitt Rubber Corp.
Independent Pneu. Tool Co.
Ingersoll-Rand Co.
Member: Associated Equipment Distributors

R. S. ARMSTRONG & BRO. CO.

676 Marietta St. Atlanta, Ga.

Representing

BEEBE Hand Hoists
BUCYRUS-ERIE Cranes, Shovels
BUTLER Bins, Batches
CHICAGO PNEUMATIC Air Compressors
DOMESTIC Pump, Hoists
GENERAL ELECTRIC Motors
HYPERBURE JENNY Valve Cleaning Machine
JAGER Concrete Mixers, Pumps, Paving Machy.
JONES-SUPERIOR Saw Rigs
LAKEWOOD Road Machinery, Handling Equipment
LE ROI Engines
LIDGERWOOD Hoists
OWEN Buckets
SAGEN Derricks and Winches
CRUSCA Drill Steel
Wicklow Iron Works Corp.
WATERLOO Bar Benders
WORTHINGTON Pumps

Member: Associated Equipment Distributors

TRACTOR & MACHINERY CO., INC.

351 Whitehall St., S.W., Atlanta, Ga.

Representing

NORTHWEST Cranes, Shovels and Draglines
NOVO Engines, Pumps and Hoists
CHAMPION Rock Crushers
ERIE Aggregater Plants
RANSOME Concrete Mixers
WORTHINGTON Air Compressors

Member: Associated Equipment Distributors

YANCEY BROTHERS, INC.

634 Whitehall St., S.W. Atlanta, Ga.

"CATERPILLAR" Tractors, Graders, Power Units, etc.
RICK Pavers, Pumps, etc.
BARKER-GREENE Derricks, Conveyors, Loaders
CEDAR RAPIDS Pumps
KINNEY Distrib. Pumps
CONNER Kettles, Tools
RICHLAND Mfg. Co.
RAMSEY Winches & Hoists
BUFFALO-SPRINGFIELD Rollers
KILLER Rippers, Drag Scrapers, Pliers, Harrows
LAPLANT-CHOATE Crane Dumper Wagons, Ball-drummers, Tampers
WARD Road Pliers
INGERSOLL-RAND Air Compressors, Pneu. Tools
THEW-LORAIN Shovels
TIMKEN Drill Bits & Serials
Member: Associated Equipment Distributors

F. H. BURLEW COMPANY

221-25 W. Huron St., Chicago, Ill.

AMERICAN HOIST Crawler Cranes, Shovels, Draglines, Bulldozers, Snow Pliers
BATES Wire Ties, etc.
BEEBE Hoists
CHAIN BELT Mixers, Pavers, Pumps, Raw Rigs, Conveyors, Elevators, Pumps, Moto Mixers
ERIE Steel Bins, Batches, Aggregater Plants
INSLEY Concr. Towers, Chuting, Cranes, Shovels, Choker Hoists, etc.
MCKIERMAN-TERRY CORP. (Division)
MCKIERMAN-TERRY—File Hammer, Extractors
LAMBERT-NATIONAL—Hoists, Cableways
STEELE & CONDUCT—Special Machinery
Wheelbarrows, Hops, Cable Rops, Taraulins, etc.
Member: Associated Equipment Distributors

O. T. CHRISTERSON CO.

3900 So. Wabash Ave. Chicago, Ill.

Representing

KOENIG—Mixers, Pavers, Cranes, Shovels, Dumpers, Mud Jacks
KWIK-MIX—Concrete and Bituminous Mixers
BLAW-KNOX—Road Forms, Bins, Batches, Finishing Machines, Buckets
GORMAN-RUPP—Self Priming Centrifugal Pumps, Road Pumps
LITTLEFORD—Distributors, Tar Kettles, Heaters, Torches
PARSONS—Trench Machines, Backfillers, Turbo Mixers
C. H. & E.—Road Pumps, Raw Rigs, 2-Ton Rollers
R. B.—Power Subgraders, Trailers
CHICAGO PNEUMATIC TOOL CO.—Compressors, Air Tools, Hose
CLEVELAND—Subgraders, Straight Edges, Finishing Tools
Concrete Cars, Wheelbarrows, Supplies

PEORIA TRACTOR & EQUIPMENT CO.

400 Franklin Street Peoria, Illinois

Representing

Athey Truss Wheel Co.
Caterpillar Tractor Co.
Killer Mfg. Corp.
LaPlant-Choate Mfg. Co.
R. G. LeTourneau, Inc.
Willamette-Hyster Co.
Universal Crusher Company

Telephone 6177

INDIANA EQUIP. CO., INC.

327-329 West Market St., Indianapolis, Ind.

Representing

ATHEY TRUSS—Wagons, OWEN—Climax Shell Buck-ets
BUFFALO-SPRINGFIELD PAGE—Dragline Buckets
—Rollers
"CATERPILLAR"—Road SAUERMAN—Cableways, Power Scrapers
"CATERPILLAR"—Trac-UNIVERSAL—Crushers, Pulverizers
GARDNER-DENVER—THEW—Shovels, Draglines
LAPLANT-CHOATE—Wag-Cons, Scrapers, Bulldozers
LE TOURNEAU—Scrapers, Buggies, Bulldozers

Member: Associated Equipment Distributors

GIERKE-ROBINSON CO.

4th & Ripley Sts. Davenport, Iowa

Representing

BLAW-KNOX—Steel Road, Curb and Gutter Forms, Bins, Batches, Clamshell Buckets, Truck Turntables
CHAIN BELT—Mixers, Pavers, Pumps, Saw Rigs, Conveyors, Elevators
CLYDE—Gasoline and Steam Hoists, Derricks
HOUGH-UNIVERSAL—Scrapers
MASTER—Vibrators, Generators, Air Welders
SULLIVAN—Air Compressors, Tools
TRACKSON—Crawlers, Shovels and Bulldozers
THEW-LORAIN—Cranes, Shovels, Draglines
TIMKEN—Detachable Rock Bins, Steels
UNIVERSAL—Truck Cranes
UNIVERSAL—Form Clamps

Member: Associated Equipment Distributors

THOMAS L. BARRET

Contractors Equipment and Supplies

712 West Main St., Louisville, Kentucky

C. H. & E. Road Pumps, BARRET Asphalt Expansion Joint
Hoists, etc.
RUSSELL Scrapers, Drags, Pliers
RANSOME Concrete Equip-ment
BAY CITY Shovels and Cranes
Reinforcing Steel, etc.

HENRY A. PETER SUPPLY COMPANY

Paducah Kentucky

Alamite Equipment
American Wire Rope, Mesh Bales Bar Ties
Bates Bar Ties
BARKER-GREENE Hoist
Black & Decker Tools
Cedar Rapids Crushers
Chain Belt (Box) Mixers
D-A Lubricants
DUPONT Explosives
Eagle Derricks
Elastic Expansion Joint
Euclid Scrapers
Fairbanks Scales
Farquhar Engines, Boilers
Gardner-Denver Tools
General Electric Motors
Gulf Steel Reinforcing
Hoist
Hansen Excavators
Hauk Hoists and Thawers

FLETCHER EQUIP. CO., INC.

309 Magazine Street New Orleans, La.

American Mfg. Co.
Bulldozer Steel Co.
Bates Valve Reg. Corp.
Clyde Iron Works, Inc.
Diamond Iron Works
The Gorman-Rupp Co.
Insley Mfg. Co.
The Jager Machine Co.
Jones Superior Machine Co.
C. S. Johnson Co.
Koenig Co.
Kwik-Mix Co.
LaSalle Co., Inc.
Littelford Bros.
M & M Wire Clamp Co.
Member: Associated Equipment Distributors

ALBAN TRACTOR CO., INC.

725-27 East 25th St. Baltimore, Md.

Representing

CATERPILLAR TRACTORS AND ROAD MACHINERY
LINK-BELT CO.
GENERAL EXCAVATOR CO.
KILLER MFG. CORP.
LAPLANT-CHOATE MFG. CO.
R. G. LETOURNEAU, INC.
GARDNER-DENVER CO.
"INVADER" SHOVELS
WILLAMETTE-HYSTER CO.
ATHEY TRUSS WHEEL CO.
BLAW-KNOX CO.
HERCULES ROLLER CO.
ROGERS BROS. CO.
WM. BROS. SHovel MFG. CO.
BUCKEYE TRACTOR MFG. CO.
PIONEER Engr'g & Eq. MFG. CO.
CATERPILLAR DIESEL AND GAS POWER UNITS
Member: Associated Equipment Distributors

D. C. ELPHINSTONE, INC.

115 S. Calvert St. Baltimore, Md.

976 Nat'l Press Bldg., Washington, D. C.

Representing

Koenig Co.
Kwik-Mix Co.
Insley Mfg. Co.
Parsons Co.
Geo. Hais Mfg. Co.
Sauerman Bros. Inc.
Allis-Chalmers Mfg. Co.
Worthington Pump & Machy. Corp.
Linn Mfg. Corp.
Owen Bucket Co.
LaSalle Co., Inc.
Emerson Pump & Valve Co.
Erie Steel Constr. Co.
H. K. Porter Co.
Reed-Prentice Corp.
Trucon Steel Co.
McKierman-Terry Corp.
Lambert-National Hoists
Goodall Rubber Co.
Miner Co.
E. D. Etnyre & Co.
Hough-Universal Scrapers
Huber Mfg. Co.
Electric Tamping & Equip. Co.
Gorman-Rupp Company
Euclid Road Machinery Co.
Hauk Mfg. Co.

Member: Associated Equipment Distributors

JOHN C. LOUIS COMPANY

511 W. Pratt St. Baltimore, Md.

Representing

JAEGER—Concrete Mixers, Pumps, Truck Mixers, etc.
LAKEWOOD—Finishers, Forms, Towers
AMERICAN CABLE—Tru-Lay Wire Rope
BUTLER—Bins
CENTAUR—Road Mowers
PIRAMS—Leaning-Wheel Graders
ALABAMA—Cast Iron Pipe
WHEELING—Corrugated Culvert Pipe
GOOD ROADS—Crushers
LITTLEFORD—Asphalt Heater, Distributors
JONES—Saw Rigs
GENERAL—Wheelbarrows
TIMKEN—Detachable Rack Bits

Member: Associated Equipment Distributors

THE HENRY H. MEYER CO.

110 S. Howard St., Baltimore, Md.

628 Munsey Building, Washington, D.C.

Representing

Barber-Greene Co.
Blaw-Knox Co.
Boston & Lockport Bl. Co.
Byers Machine Co.
Phillips Carey Co.
Columbus Conveyor Co.
Canary & Co., Inc.
Edwin Fdry. & Mach. Co.
Domestic Eng. & Pump Co.
Don Norton Mfg. Co.
Harrington Co.
Ingersoll-Rand Co.
A. Leschen & Sons Rope Co.
Lidgerwood Mfg. Co.
Lima Locomotive Works
Master Vibrator Co.
New Engine Co.
Pines Equis. Co.
Pulsometer Steam Pump Co.
Ransome Concrete Machy. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kently & Co.
Union Iron Works
Universal Road Machy. Co.

Member: Associated Equipment Distributors

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets, Finishers
PIONEER—Crushers, Gravel Plants
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressor
OR-SEBOWER—Hoists, Boilers, Mixers
HAUCK—Oil Burners and Heaters
HAISIS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
BEEBE BROS.—Hoists
CLEVELAND—Formgraders
C. R. JAHN CO.—Trailers
BURCH—Road Pliers, Road Machinery
HOMESTEAD—Hydraulic Jack Cleaners
PIERCE—Rollers
MASTER—Vibrators
COMPLETE—Wellpoints
ELYDINE—Motor Mixers
HAZARD—Wire Rope, Cable
ATLAS—Powder, Blasting Equipment
Member: Associated Equipment Distributors

THE EQUIPMENT CO.

30 Prentiss St. Boston, Mass.

Representing

Link-Belt Cranes and Shovels
Ingersoll-Rand Compressors and Tools
"Williams" Buckets and Trailers
Homelite Pumps and Generators
Hanson Excavators and Trailers
COMPLETE RENTAL SERVICE
Member: Associated Equipment Distributors

HEDGE & MATTHEIS CO.

285 DORCHESTER AVE. BOSTON, MASS.

Boston, Springfield, Worcester, Mass.; Portland, Bangor, Me.; Hartford, New Haven, Conn.; Concord, N. H.; Bellows Falls, Vt.; Providence, R. I.
J. D. Adams Co., Inc.
Aerol Turner Co.
Amer. Tubular Elevator Co.
Byers Machine Co.
Chicago Automatic Conveyor Co.
Erie Steel Constr. Co.
Four-Wheel Drive Sales Co.
Frim, Carl H.
Huber Mfg. Co.
Ingersoll-Rand Co.
Jager Machine Co.
Jones Superior Machine Co.
Lakewood Engr. Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Wks., Inc.
Shovel & Crane Division
Linn Manufacturing Corp.
McKierman-Terry Corp.
Lambert-Nat'l Hoist Div.
Owen Bucket Co.
Page Engineering Co.
Parsons Co.
Red Star Products Co.
Rosen Bros. Corp.
Sagen Derrick Co.
Sauerman Bros. Inc.
Sutton Co.
Teledo Pressed Steel Co.
Universal Form Clamp Co.
Wood Shovel & Tool Co.

ABRAMS-ANDERSON CO.

Construction Equipment

10425 Northlawn Ave., Detroit, Mich.

Representing

Aerol Turner Co.
Archer Iron Works
Brookville Locomotive Co.
Butler Bin Company
Bucyrus-Erie Co.
C. H. & E. Mfg. Co.
Hazard Wire Rope Company
Independent Pneumatic Tool Co.
LeROI-Rix Compressors
Sagen Derrick Company
T. L. Smith Company
Smith Engineering Works
Sterling Wheelbarrow Co.
Teledo Pressed Steel Co.

Member: Associated Equipment Distributors

WE WOULD LIKE TO HAVE YOU HELP US

keep this Directory of Dealers in construction equipment up to date. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue, New York

CONTRACTORS MACHY. CO.

530 Monroe Ave., N.W. Grand Rapids, Mich.

Northwest Engineering Co.
Sullivan Machinery Co.
Pioneer Gravel Equipment
Mfg. Co.
Clyde Sales Company
Page Engineering Co.
American Steel & Wire Co.
Burch Corporation
Ross Snow Plows
Sageen Derrick Company
Sauerman Brothers
Syntron Company
LeRel Company
Aerial Burner Company
Conroy & Company

Moritz-Bennett Company
Ames Shovels
Rowe Manufacturing Co.
Toledo Pressed Steel Co.
Bates Wire Ties
Truckco
Rex Mixers and Pumps
Barco Gas Hammers
Blaw-Knox Company
Dietz Lanterns
Black & Decker Tools
Atlas Conveyors
Master Vibrators
Lansing Company

Member: Associated Equipment Distributors

LANGE TRACTOR & EQ. CO.

304 Lake Ave., S. Duluth, Minn.

Cleveland Rock Drills
Adams Road Machinery and
Power Shovels
Atco Scrapers and
Buildings
Leash Concrete Mixers
Leshart Wagons

Gehi Culverts
Hanson Trailers
Wausau Snow Plows
Oshkosh 4-Wheel Drive Trucks
MacWhitty Wire Rope
Speeder Power Shovels

Member: Associated Equipment Distributors

THORMAN W. ROSHOLT CO.

3138 Snelling Ave. Minneapolis, Minn.

IOWA "Cedar Rapids"
Crusher Plants and Equip.
KOEHRING Pavers, Mix-
ers, Cranes, Dumpers,
Mud-Jacks, Shovels
RAMSEY Hoists and Bi-
tuminous Distributors
CHICAGO Pneumatic Com-
pressors and Tools
MCCORMICK-DEERING
Industrial Tractors
KWK-MIX Mixers
RIDDELL Power Grader
JOHNSON Hatchers and
Demountable Bins
TRACKSON Loaders and
Cranes
BYERS Shovels and Cranes

VULCAN Steam and Gas
Locomotives
LIDGERWOOD Hoists
SARGENT Snow Plows
METAL FORMS CORP.
ROSCO Trailers and Bi-
tuminous Distributors
WALTER Trucks
GORMAN-RUPP CO. Pumps
UNION IRON WORKS
BUFFALO-SPRINGFIELD
Rollers
MASTER Vibrators
OWEN Buckets
BEACH Saws
LEAFER-BROOKS Boilers
BUYRUS-ERIE Scrapers
BARCO Hammers

Member: Associated Equipment Distributors

WM. H. ZIEGLER CO., INC.

Minneapolis, St. Paul, Duluth, Crookston, Minn.

"CATERPILLAR"—Trac-
tors, Engines, Road Ma-
chinery
LAPLANT-CHOATE—Bulldoz-
ers, Snow Plows, Dump
Wagons
LETOURNEAU—Dirt Mov-
ing, Road Equipment
KILFEER—Road Rippers,
Scrapers
ATHEY—Crawlers, Dump
Wagons, Trailers
BUYRUS-ERIE—Power
Shovels, Cranes, Draglines
PIONEER—Crushers, Gravel
Plants
REX—Mixers, Pavers, Saw
Rigs

BUTLER—Hoists, Batches
BARBER-GREENE—Con-
veyors, Loaders, Ditchers
F. W. D.—Four-Wheel
Drive Trucks
PLYMOUTH—Locomotives
GARDNER-DENVER—Air
Compressors, Drills
LESCHEN—Wire Rope
LITTLEFORD—Oil Dis-
tributors, Tar Kettles,
Heaters
"WILLIAMS"—Buckets, Heavy-
Duty Trailers
HYPPESURE JENNY—
Spray Cleaners
MADSEN—Asphalt Plants

Member: Associated Equipment Distributors

BUBLITZ MACHINERY CO.

2305 Pennway, Kansas City, Mo.

Austin-Western Rd. Machy. Co.
Cleveland Tractor Co.
Jaeger Machine Co.
Lakewood Engineering Co.
Thew Shovel Co.
Barber-Greene Company
McKiernan-Terry Corp.
Whitcomb Locomotive Co.
Butler Bin Co.
"Williams"—Buckets and Trailers
Ames Baldwin Wyoming Co.
Red Star Products Co.
Sageen Derrick Co.
Schramm, Inc.
Electric Tamping & Equipment Co.
MacMillan Petroleum Corp.
Bathlehem Steel Co. (Williamsport Div.)

Member: Associated Equipment Distributors

O. B. AVERY COMPANY

1325 Macklind Avenue St. Louis, Mo.

AUSTIN Tractors
HERCULES Rollers
BLAW-KNOX Bins, Buckets, Finishers, Forms
BRODERICK & BASCOM Wire Rope
CHAIN BELT Mixers, Pavers, Pumps
DEMPSTER Dumpsters
LACROSSE Trailers
KEWEE Conveyors
KOB Spreaders
LAMBERT-NATIONAL Hoists
McKiernan-Terry Pile Hammers
NORTHWEST Shovels, Cranes & Draglines
PIECE Rollers
R-B Subgraders
CEDAR RAPIDS Crushers
STANDARD Bituminous Distributors
SULLIVAN Compressors & Air Tools
VULCAN Locomotives

Member: Associated Equipment Distributors

CORBY SUPPLY COMPANY

3942-46 W. Pine Blvd., St. Louis, Mo.

AMERICAN—Flexible Metal Hose
BUNL CO.—Portable Air Compressors
CHAMPION RIVET CO.—Rivets and Welding Rod
DETROIT HOIST & MACH. CO.—Air and Electric
Hoists
DEVILBISS CO.—Paint Spray Equipment
HARDGOLD WOODER DRILL CO.—Rock Drills and
Paving Breakers
WM. H. KELLER, INC.—Super Pneumatic Tools
MUNSELL—Air-Driven Tools
PANGBORN CORP.—Sandblast Equipment
PENNSYLVANIA—Air Compressors and Pumps
DAVID ROUNDTOP & SON—Chemicals
STAYNEW—Air and Pipeline Filters
N. A. STRAND & CO.—Flexible Shaft Equipment
VAN DORN—Electric Drills, Grinders and Buffers
VICTOR—Welding and Cutting Apparatus
WESTINGHOUSE—Arc Welding Equipment
GUSTAV WIEDEKE CO.—Tube Expanders

JOHN FABICK TRACTOR CO.

Gravois & Iowa Aves. St. Louis, Mo.

Athey Truss Wheel Co.
Wellman Engineering Co.
Buffalo-Springfield Roller Co.
Caterpillar Tractor Co.
Killefer Mfg. Co.
LaPlant-Choate Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Thew Shovel Company
Willamette-Hyster Co.
R. G. LeTourneau, Inc.
Ramsey Machinery Co.

Member: Associated Equipment Distributors

JOSEPH KESL RENTAL EQUIPMENT CO.

1510 North 13th St. St. Louis, Mo.

Wm. Bros. Boiler & Equip. Co.
General Wheelbarrow Co.
Toledo Pressed Steel Co.
Contractors Machinery Corp.
C. H. & E. Mfg. Co.
Fairbanks, Morse & Co.
Ames Baldwin Wyoming Shovel Co.
Aerial Burner Co.
C. H. & E. Mfg. Co.
Klein-Logan Co.
Page Engineering Co.
St. Louis Steel Products Co.
Sageen Derrick Co.
Slusser-McLean Co.
Truckco

Member: Associated Equipment Distributors

C. F. RABBEIT, INC.

1523 N. Broadway St. Louis, Mo.

Butler Bin Co.
Cleveland Formgrader Co.
Cleave-Brooks Co.
Drive-Doyle Co.
Fairbanks, Morse & Co.
Good Roads Machinery Corp.
Frank G. Hough Co.
Huber Mfg. Co.
Instley Mfg. Co.
Koebling Co.

Kwik-Mix Concrete Mixer
Co.
Lidgerwood Mfg. Co.
Master Vibrator Co.
Metal Forms Corp.
Northern Conveyor Co.
Parsons Co.
Russo Mfg. Co.
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Wellman Engineering Co.

Member: Associated Equipment Distributors

THE GEO. F. SMITH CO.

Franklin & Channing Aves., St. Louis, Mo.

Ingersoll-Rand—Compre-
ssors, Air Tools
Clyde—Hoists and Derricks
Owen—Clamshell Buckets
Hauco—Heaters
Sageen—Derricks & Winches
Skilaw—Electric Saws,
Drills
Skelton—Shovels
LeRel—Engines
Symons—Column Clamps
Winslow—Weighting Scales
Universal—Form Clamps
Link-Belt—Cranes, Shovels,
Draglines
Novo—Pumps

Vulcan—Steam and Drop
Hammers
Waukesha—Engines
Malt—Vibrators and Grind-
ers
Archer—Tower Equipment
Red Star—Wheelbarrows
and Shores
Templeton, Kenly & Co.—
Trench Braces, Jacks
Smith—Mixers, Pavers
Vail—Tie Wires and Tools
American Steel & Wire—
Rope
Ramsey—Winches

Member: Associated Equipment Distributors

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while check-
ing over this directory will you
please advise us, because it is our
desire to keep it accurate and up
to date at all times.

CONTRACTORS AND ENGINEERS
MONTHLY

470 Fourth Ave. New York

NORTHWEST EQUIP. CO., Inc.

Box 1112 Great Falls, Mont.

Complete Line of Road Machinery
and Contractors' Equipment

PIONEER Gravel Equip.
KOEHRING Mixers, Pav-
ers, Shovels
INSLEY Concr. Towers
PARSONS Ditchers
PANTHER Oil, Grease

COLEMAN Trucks
GORMAN-RUPP Pumps
OWEN Buckets
SCHRAMM Compressors
MacWHYTE Rope
CLEVELAND Rock Drills

Steel Bridges and Traffic Treads, Presses, Plows, Scrapers, etc.

HEYNIER BROTHERS

6th Ave. & F St., Belmar N. J.

Jaeger Mixers
Self-Priming Pumps
Diaphragm Pumps
Richmond Form Ties
Rubber Hose and Boots
Manila and Wire Rope
Expansion Joint
Screw Jacks
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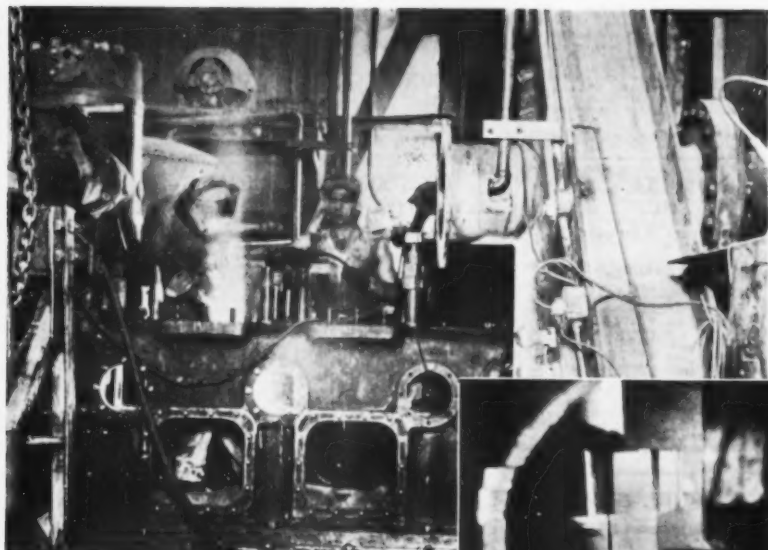
Left, a Corner of One of Iowa's District Garages, Showing the Overhead Barrels of Oil with Pipes Running Down for Service. In the Upper Left-Hand Corner is the Air Compressor Unit and Overhead Are the Heat Conduits for Heating the Garage.

Right, Another Corner of an Iowa State Highway Commission District Garage, Showing the Welding Outfit, Overhead Trolley and Hoists, Press and Small Tools. A Description of This State's Highway Garages and their Equipment Appears on Page 17.



C. & E. M. Photos

Two Pieces of Contractor's Equipment Which Contributed to the Speedy Completion of the Forcum-James Construction Co.'s 9.672-Mile Concrete Paving Job in Mississippi Last Summer. Above, the Utility Acetylene Welder for Job Repairs Built by the Boss Mechanic and, Right, Fred Nelson and His "Go-Devil" for Perfect Finishing of Joints. See Page 28.



Repairing a Crack in the Sub-Base of a 450-Hp Diesel Engine. Above, a Welder Working with a 20-Inch Special Electrode Holder. Inset, a Replacement Stud and Thimble in Place, Ready for Welding. See Page 1.



C. & E. M. Photo

Fast Spreading of the Initial Cover of the Base Rock in the Fills on John Iafolla's 2.3-Mile Grading Job in Vermont. See Page 2.



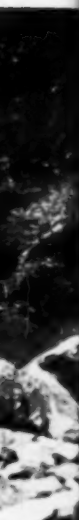
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Watch Your Eyes When This Outfit Goes By! A Broom and Blower Cleaning the Base before Priming on the Vandigriff D.B.S.T. Job Near Sylacauga, Ala. See Page 1.



Another Problem in the Life of a Highway Engineer. The Lowly and Innocent Appearing Cricket (Shown at Left) When Multiplied by a Million or So Frequently Creates a Dangerously Slippery Condition on Nevada's Highways. See Page 35.





afolla's

Highway
Appearing
Multiplied by
a Danger-
la's High-

